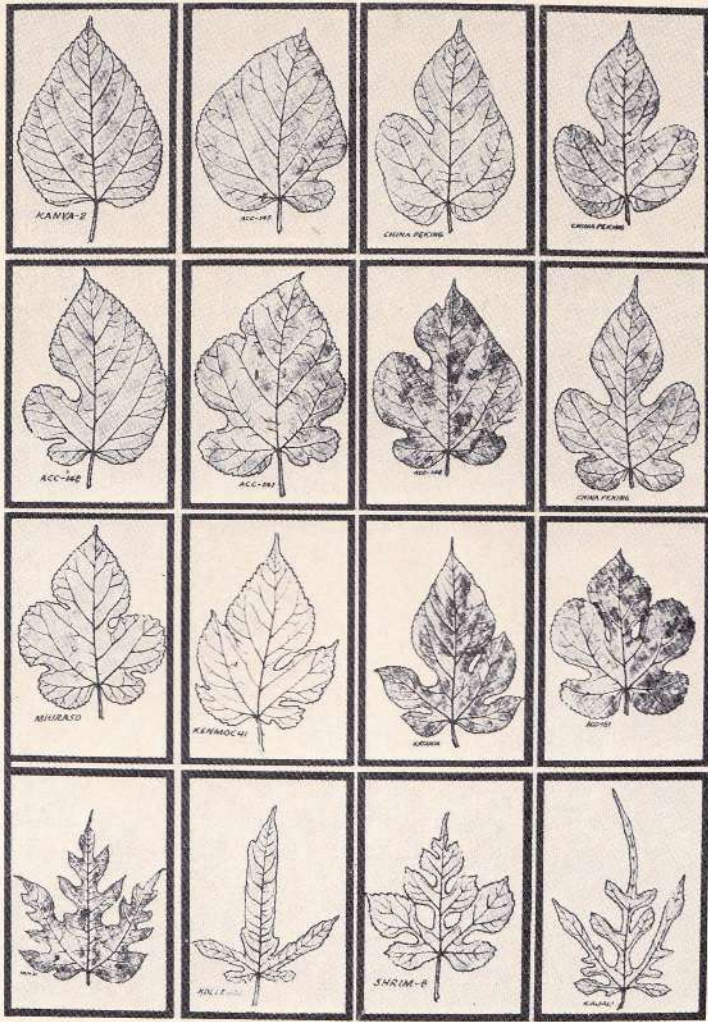


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# MULBERRY DESCRIPTOR



1986

CENTRAL SERICULTURAL RESEARCH AND TRAINING INSTITUTE  
Central Silk Board – Government of India  
Srirampuram, MYSORE – 570 008

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## INTRODUCTION

The effective utilisation of germplasm depends on systematic characterisation and identification of genotypes with specific traits. Owing to the fast spread of sericulture to different Indian states and to tropical countries, the need for a mulberry genotype of specific characters is very much felt. Though large amount of variability is available in existing population and in the introduced material, systematic characterisation has not been made. This is mainly due to the lack of internationally accepted mulberry descriptor. Even in the most advanced sericultural countries no attempt has been made to suggest a model descriptor for describing the existing mulberry genotypes. As a result the valuable genetic variability is not exploited. Considering this lacuna, an attempt has been made to formulate mulberry descriptor according to Hackett (1979a) and acceptable to International Compendium programme and International Board of Plant Genetic Resources (IBPGR). This may serve as a model to describe different taxa.

## MATERIALS AND METHODS

250 accessions of both wild and cultivated forms belonging to 13 species of the genus *Morus* L. (table-1) from 11 different countries were studied. From India, material was collected from 10 different states and germplasm conserved at Central Sericultural Research and Training Institute, Berhampore; Regional Sericultural Research Station, Pampore; Regional Sericultural Research Station, Kalimpong and Univoltine Research station, Majra (table-2). Both exotic and indigenous materials were planted in the mulberry germplasm bank of Central Sericultural Research and Training Institute, Mysore under identical agro-climatic conditions. Uniform package of practices were followed with respect to spacing, planting method, manurial/fertilizer doses, intercultivation and harvesting. Studies included 12 observations for three years covering the major seasons of the year. Average values of the observations were taken. The descriptor includes nine major groups of characters covering Phytogeography, Grossmorphology; Reproductive biology, Anatomy, Cytology, Growth/yield attributes; Quality parameters; Response to different cultivation practices and Resistance to pests and diseases. 138 characters contributing directly or indirectly to the growth and yield were taken into consideration. Provision has been made to include all specific characters of the genotypes and group them into different clusters.

## RESULTS AND DISCUSSION

Descriptor prepared based on 130 characters of 9 major groups is presented in Annex. 1. Extent of variability observed in each character is taken as a base for describing the particular character. Morphological characters such as leaf lobation, internodal distance, sex of the plant, nature of style and stigma were observed in detail and their possible utilization for classifying mulberry is suggested. 9 important growth/yield parameters as suggested by Das and Krishnaswami (1969); Dandin et al., (1983) were considered for study. Extent of variability and average value of these parameters are given in table.3. Responses of the genotypes to different agronomical practices are taken into consideration to suggest suitable package deal for each genotype. All the major diseases and pests prevalent in the important sericultural countries of the world are included so that genotypes of diverse nature showing resistance to any one of these pathogens can be chosen.

→ The main objective of the present descriptor is to serve as a ready reckoner for morphological and agronomical description of the strain/variety. As provision is made for all the known characters which influence/contribute to the full growth and foliage production of the plant, it is hoped that this will serve as a model for quick review of the features of a genotype. Also it serves the purposes of information resource for genetic variability, growth requirements and special genes.

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TABLE 1:

SPECIESWISE COMPOSITION OF MULBERRY STRAINS MAINTAINED  
AT CENTRAL SERICULTURAL RESEARCH AND TRAINING INSTITUTE,  
MYSORE.

Species	No. of accessions
<i>M. alba</i>	18
<i>M. australis</i> ( <i>M. acidosa</i> )	1
<i>M. bombycis</i>	5
<i>M. cathyana</i>	1
<i>M. chinensis</i>	2
<i>M. indica</i>	21
<i>M. laevigata</i>	4
<i>M. latifolia</i> ( <i>M. multicaulis</i> )	24
<i>M. lhou</i>	2
<i>M. nigra</i>	2
<i>M. serrata</i>	4
<i>M. tiliaefolia</i>	1
Unidentified	73
Total	158

TABLE 2:

Mulberry germplasm included in the present study

1. CSRTI, Mysore	38
2. CSRTI, Berhampore	12
3. RSRS, Kalimpong	—
4. RSRS, Majra	20
5. RSRS, Pampore	14
6. RSRS, Coonoor	2
7. BSI, Calcutta	2
8. Sericultural Department, J & K, Meergund	4
9. Other countries (Exotic)	66
10. Elite F1 hybrids (CSRTI, Mysore)	101
Total	259

TABLE 3

Range of variability of the characters of the accessions studied

Character	Maximum	Minimum	Average	No. of accessions exceeding the average
Plant height (cm)	355.40 (141)	100.30 (Goshoerami)	227.85	37
Internodal distance (cm)	7.38 (Miz x BC - P4)	2.55 (102)	4.81	38
Weight of 100 leaves (gm)	1400 (Goshoerami)	98.0 (117)	430.52	73
Leaf petiole ratio by weight	92.98:7.02 (132)	64.5:35.5 (135)	78.74:21.26	129
Sprouting percentage	99.2 (103)	1.36 (K2 x BC-P6)	49.6	110
Rooting percentage	100.0 (117)	2.44 (Local x Kosen) P3	50.0	85
Moisture percentage	78.7 (116)	45.8 (WB x Kosen P1)	62.25	114
Moisture retaining capacity (percentage)	76.80 (Miz. x catt. P3)	41.26 (WB x Kosen P1)	59.03	137
Leaf area/meter length of shoot (sq cm)	7093.75 (167)	1225.73 (138)	4159.74	38

## MULBERRY DESCRIPTOR

## I. PHYTOGEOGRAPHICAL INFORMATION:

1. Botanical name :
2. Common/Varietal name :
3. Origin : Indigenous/Exotic  
(country/State/Province)
4. Wild or cultivated :
5. If cultivated
  - a. Mode of origin : Introduction/Selection/  
Hybrid/Mutant/Polyploid
  - b. Areas of cultivation : Temperate/Tropical/  
Sub-tropical

## II. MORPHOLOGICAL CHARACTERS

(Vegetative)

1. Habit : Tree/Bush
2. Branching nature : Erect/Spreading/Drooping
3. Colour of the stem :
4. Lenticels
  - a. Presence : Present/Absent
  - b. Distribution : Dense/Medium/Sparse
5. Colour of the young shoot : Green/Purple/Dark purple
6. Leaf
  - a. Internodal distance : Top (1-7 leaf)  
Middle (8-15 leaf)  
Base (below 15th leaf)
  - b. Phyllotaxy : Alternate/opposite/Whorled
  - c. Rank : 1/2, 2/3, 2/5, 3/5
  - d. Nature : Uniform/Heterophyllus
  - e. Stipules
    - i. Presence : Present/Absent
    - ii. Nature : Simple/Foliaceous
    - iii. Duration : Deciduous/Caducous.
  - f. Petiole length (cm) :
  - g. Lamina
    - i. Lobation : Lobed/Entire  
If lobed : Regular/Irregular
    - ii. Shape :
    - iii. Base :
    - iv. Apex :
    - v. Margin :

- vi. Surface :
- vii. Texture :
- viii. Hairiness :
- ix. Venation :
- x. Average leaf size : Length/Breadth (cm)/ Area (sq.cm)
- xi. Thickness ( $\mu$ ) :

### III. REPRODUCTIVE STRUCTURES

- 1. Sexuality : Male/ Female/ Monoecious/  
Bisexual/ Mixed
- 2. Flowering nature : Regular/ Occasional
- 3. Frequency : Heavy/ Shy
- 4. Inflorescence
  - a. Length (cm) :
  - b. Diameter (cm) :
  - c. Flower arrangement : Loose/ Thick
- 5. Male flowers
  - a. No. of stamens
  - b. Nature : Exerted/ Included
- 6. Pollen grains
  - a. Size :
  - b. Openings :
  - c. Fertility (%) :
  - d. Viability (%) :
- 7. Female flower
  - a. Style length (mm) :
  - b. Stigma
    - i. Length (mm) :
    - ii. Hairiness : Pappilose/ Pubescent
    - iii. Nature : Bifid erect/ Bifid divericate/  
Bifid spreading
- 8. Fruit
  - i. Size; length/diameter (cm) :
  - ii. Colour :
  - iii. Taste (ripe fruit) : Sweet/ Salty/ Sour
- 9. Seed
  - a. 100 seed weight (mg) :
  - b. Germination (%) :
  - c. Viability (Duration) :



#### IV. ANATOMICAL FEATURES

1. Idioblasts
  - a. Presence : Present/Absent
  - b. Frequency (No. /sq. cm) :
  - c. Size (width) :
  - d. Shape :
  - e. Projection length ( $\mu$ ) :
2. Stomata
  - a. Distribution : Abaxial/Adaxial
  - b. Type :
  - c. Position : Sunken/Surface
  - d. Frequency (per unit area) :
  - e. Size ( $\mu$ ) : Length/Breadth
  - f. Guard cell size ( $\mu$ ) : Length/Breadth
  - g. Stomatal chloroplast no. :
3. No. of palisade layers :
4. Ratio of palisade/spongy layer by thickness :
5. Thickness of cuticle ( $\mu$ ) :
6. Special features, if any :

#### V. CYTOLOGICAL DETAILS

1. Somatic
  - a.  $2n$  chromosome No. :
  - b. Ploidy level :
  - c. Karyotype formula :
  - d. Total chromatin length :
  - e. No. of sat-chromosomes :
  - f. No. of large chromosome pairs :
2. Meiotic
  - a. Meiotic behaviour : Regular/Irregular
  - b. Chromosome configuration :
  - c. Meiotic abnormalities :
  - d. Tetrad type :
3. Special features, if any

## VI. PROPAGATION

1. Sprouting : Fast/Medium/Slow
  - a. Quality
  - b. percentage on 20th day
2. Rooting : Fast/Medium/Slow
  - a. Nature
  - b. percentage (on 60th day)
3. Root proliferation rate (on 90th day)
  - a. weight of dry roots
  - b. length of longest root
  - c. dry shoot/root ratio (by weight)
4. Suitability as stock : Good/Medium/Poor
5. Cuttings standards for propagation
  - a. Optimum age of shoot
  - b. Optimum length of cutting
  - c. Optimum girth of cutting

## VII. GROWTH AND YIELD ATTRIBUTES

### A. Quantitative

1. Growth : Slow/Medium/Fast
  - a. Nature
  - b. Rate/90 days(cm)
    - i. No. of primary branches
    - ii. Length of primary branches (cm)
    - iii. No. of secondary branches
    - iv. Length of secondary branches (cm)
    - v. Total shoot length (cm)
    - vi. Leaf No./meter
    - vii. Wt. of 100 fresh leaves (gm)
  - c. Lamina/Petiole ratio
    - i. By length
    - ii. By weight
  - d. Leaf-shoot ratio by wt.
  - e. Total leaf yield/plant/harvest
  - f. annual yield/plant
  - g. Calculated yield/ha

## B. Qualitative

1. Moisture %
  - i. Top Middle Base  
(1-7) (8-15) (below 15)
  - ii. Average
2. Moisture retention capacity,  
average at 12th hour of harvest :
3. Chemical contents :
  - i. Non reducing sugars :
  - ii. Reducing sugars (%) :
  - iii. Total sugars (%) :
  - iv. Crude protein (%) :
  - v. Mineral (%) :
  - vi. Fibre (%) :
4. Palatability :
5. Moulting test (70% feed  
upto 2nd moult) :
6. Leaf cocoon ratio  
(by feeding trial) :

## VIII. RESPONSE TO DIFFERENT PHYSIOLOGICAL CONDITIONS

1. Resistance to drought Resistant/Tolerant/Susceptible
2. Resistance to salinity Resistant/Tolerant/Susceptible
3. Response to winter Good/Medium/Poor
4. Response to repeated pruning Good/Medium/Poor

## IX. RESISTANCE TO DISEASES AND PESTS

1. Diseases:
  - a. Fungal leaf spot  
**Cercospora moricola** Resistant/Tolerant/Susceptible
  - b. Powdery mildews  
**Phyllactinia corylea** Resistant/Tolerant/Susceptible
  - c. Leaf rust  
**Cerotelium fici** Resistant/Tolerant/Susceptible
  - d. White root rot  
**Rosellinia necatrix** Resistant/Tolerant/Susceptible
  - e. Violet root rot  
**Helicobasidium mompa** Resistant/Tolerant/Susceptible
  - f. Bacterial leaf spot  
**Pseudomonas mori** Resistant/Tolerant/Susceptible
  - g. Any other disease  
(Not covered above)

2. Pests:

a. Hairy caterpillar

**Diacrisia obliqua**

b. Jassids **Empoasca flavescens**

c. Mealy bugs

**Maconellicoccus hirsutus**

d. Red scale **Aonidella**

**aurantii**

e. Thrips (5 species)

f. Mites

**Tetranychus sp**

g. Root knot nematode

**Meloidogyne incognita**

h. Any other pests

(Not covered above):

Resistant/Tolerant/Susceptible

Resistant/Tolerant/Susceptible

Resistant/Tolerant/Susceptible

Resistant/Tolerant/Susceptible

Resistant/Tolerant/Susceptible

Resistant/Tolerant/Susceptible

Resistant/Tolerant/Susceptible