Draft

Guidelines

For the Conduct of Test for

Distinctiveness, Uniformity & Stability on

Ailanthus

[*Ailanthus excelsa.* Roxb.]

Protection of Plant Varieties and Farmers' Rights Authority
(A Statutory Body created by an Act of Parliament)
Government of India, New Delhi

CONTENTS

Ailanthus

[*Ailanthus excelsa.* Roxb.]

I. Subject

These testing Guidelines shall apply to all clonally propagated varieties of Ailanthus (*Ailanthus excelsa.* Roxb.)

II. Materials required

1. The Protection of Plant Varieties & Farmers' Rights Authority (PPV&FRA) shall decide when, where and in what quantity and quality the plant material are required for testing of a variety denomination applied for registration under the Protection of Plant Varieties and Farmers Rights (PPV&FR) Act, 2001. Applicants submitting such planting 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.
2. The plant material supplied should be visibly healthy, not lacking in vigour or affected by any important pests or diseases.
3. The minimum number of planting material to be supplied by the applicant or his nominee during June- July shall be **60 rooted plants**. The age of the plants shall be six months while submitting the testing.
4. Clonally propagated plant materials of 60 cm height from collar to apical tip are required for DUS testing. The Plants must have fully developed root system.
5. The plant material should not have undergone any treatment, which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

III. Conduct of tests

1. The applicant can opt the DUS test of the variety, either to be ONSITE DUS test at their specified address or field DUS test at the DUS centre. In case of field DUS testing, the tests shall normally be conducted at two locations, if any essential characteristics of the candidate variety are not expressed for visual observation at these locations, the variety shall be considered for further examination at another appropriate test site or under special test protocol on expression of interest of the applicant.

2. The minimum duration of DUS tests shall normally be up to two independent similar flowering cycles. If distinctness and / or uniformity cannot be sufficiently established in one growing period, the test should be extended for a second growing period.
3. The tests shall be carried out under conditions ensuring satisfactory grown for the expressions of the relevant characteristics of the variety and for the conduct of the examination.
4. The design of the tests shall 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 period.
5. Test plot design

No of rows	: one
Row to row distance	: 3 m
Plant to plant distance	: 3 m
No of plants per replication	: 6
No of Replication	: 3

Test plot will be surrounded by guard row.

6. On- site DUS testing

a) On –site testing shall be conducted at the places specified by the applicant. The age of the trees at on-site shall above three years to a maximum of eight years. Details on the mother plants shall be provided to the committee. A trial with minimum of 18 trees in 1-2 blocks planted in uniform spacing shall be considered for on –site testing. The trees must be healthy and free from pest and disease and raised under standard management practices (Annexure I)

b) The Expert Committee constituted by the PPV&FRA in consultation with the DUS center shall be authorized to inspect on site testing and recording of the appropriate characters.

c) In case of farmers' variety, the applicant should have well grown mother plant and 5 vegetative propagated plants for inspection and examination for ONSITE DUS testing at farmers field.

7. Additional test protocol for special purpose shall be established by the PPV & FR Authority.

IV. Method of Observations

1. The characteristics described in the table of characteristics shall be used for testing of varieties for their DUS (Section VII)

2. The assessment of distinctiveness and stability of all observations shall be made on 6 plants or parts taken each of 6 plants, which will be equally divided among 3 replications (**2 Plants** per replication)
3. The assessment of uniformity characteristics shall be made in 6 plants per replication, with an acceptance probability of at least 95%. The maximum numbers of off-type allowed would be 1 in 18 plants.
4. Observation on the tree habit will be made on mature trees with fully developed trunk and crown when the entire tree is found with foliage.
5. A sample of 30 leaflets from a total of six trees shall be taken for morphometric characterization. All observation of leaf leaflets shall be made in mature leaflets at middle of the crown. The observations for length and width on the mature leaf and leaflets will be made on the middle part of leaf /leaflet. All observations for length of petiole and rachis will be made on the mature leaf unless otherwise mentioned.
6. The branch let, flower, fruit and seed characteristics shall evaluate from 30 samples collected from six trees. Samples shall be collected from the longest primary branch in the mid portion of the crown.
7. Observations of the Clear bole height of the stem will be taken at breast height (1.3 m)
8. Observations on the inflorescence shall be made at the time of peak flowering on inflorescences borne on typical shoots. Observations on the flowers will be taken from the middle part of the fully developed inflorescence.
9. Observation on mature fruit shall be recorded when the fruit is ready for harvesting. All fruits for observation will be taken from periphery of the tree on fully mature fruits.
10. All observations on the seeds will be made on mature fruits well developed**.**

S. No	**Characteristics**	**Stage of observation**
1.	Tree character	The observation on the tree habit is made when the entire tree is found with foliage. Observations on the tree habit will make on mature trees with a fully developed trunk and crown with complete foliage of at least 3 years of age.
2.	Leaf character	All the observations on leaf will made on fully developed leaves from amidst vigorous shoots occupying the peripheral/circumference of tree crown. All observations for length and width on the mature leaf and leaflets will be made on the central part of leaf/leaflet. All observations for length of petiole and rachis will made on the mature leaf unless otherwise mentioned.

3.	Inflorescence character	Observations on the flowers will be taken from fully developed inflorescence at the beginning of anther dehiscence and also at the time of full flowering of the tree. Observations on the flowers will be made on the second and subsequent flowers of the inflorescence at the start of anther dehiscence.
4.	Fruit character	All fruits for observation will be taken from periphery of the tree and fruit. Observations on the fruits will be made on 20 typical fruits taken from a minimum sample size of 50 fruits at the time of full maturity. Observations on the fruit shape will be presented as they appear in nature; nevertheless, shape is to be observed in direction from the base (stalk end) to the top.
5.	Seed character	All observations on the seeds will be made on mature fruits well developed.

11. A decimal code in the sixth column of table of Characteristics indicates the stage for the observation of each characteristic during the growth and development of the variety. The relevant growth stages corresponding to the decimal code number described below.

Codes for different growth stages

S.No	Code	Growth Stage
1	10	Coppice stage: Coppice shoots of minimum 1.5 m tall
2	30	Tree is minimum 2.5 m tall; about well-developed 90 cm meter long branches; few mature leaves start falling.
3	50	Tree is minimum3.5 m tall; few flower panicles starts at terminal and primary branches.
4	60	Tree is minimum 5 m tall; fruits are set at the terminal and primary branches

V. Grouping Varieties

1. The candidate varieties for DUS testing shall be divided in to groups to facilitate the assessments of distinctiveness. Characteristics which are known from experience not to vary or to vary only slightly, within a variety and which in their various states are fairly evenly distributed across all the varieties in the collection are suitable for grouping purpose.
2. The following Characteristics shall be used for grouping *Ailanthus*

i. Tree Branching : (Charactersitic 1)

ii. Scar shape : (Charactersitic 5)

iii. Leaflet petiole : (Charactersitic 13)

iv. Leaflet lamina base shape : (Charactersitic 16)

v. Stem Clear Bole height : (Charactersitic 20)

vi. Flower merosity : (Charactersitic 23)

VI. Characteristics and symbols

1. To assess distinctiveness, uniformity and stability, the characteristics and their states as given in the table of characteristics (Section VII) shall be used.
2. Notes (1-9) shall be given for each state of 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, excepts when the state of expression of any of these characters is rendered impossible by the environment al conditions of the testing region. Under such exceptional situation, adequate explanation shall be provided.

(+) see explanation on the table of Characteristics (illustrated by explanation and drawings) in chapter VIII. The plant parts on which observations to be taken are given in the explanation or figure(s) for clarity and the colour of variation.

1. Characteristics denoted with symbols QL, QN and PQ in first column of the Table of characteristics shall be indicated as: QL: Qualitative characteristic QN: Quantitative characteristic PQ: Pseudo-qualitative characteristic.
2. Types of assessment of characters indicated in column seven of Table characteristics are as follows:

   MG: Measurement by a single observation of a group of plants or part of plants.

   MS: Measurement of a number of individual plants or parts of plants.

   VG: Visual assessment by a single observation of a group of plants or plant parts.

   VS: Visual assessment by observation of individual plants or parts of plants.

VII. Table of characteristics

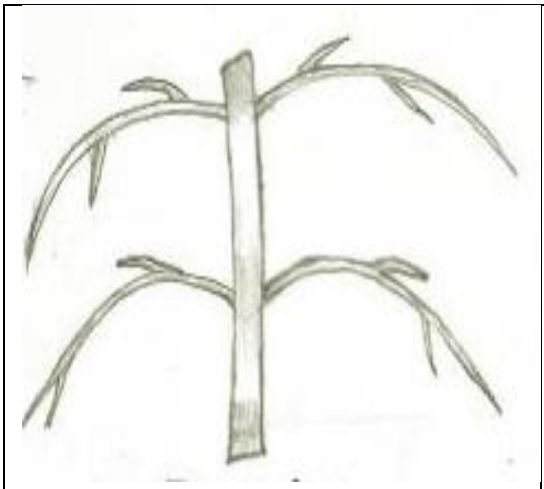
Sl. No.	Characteristics	State	Note	Example Varieties	State of observation	Type of assesment
1	2	3	4	5	6	7
1.(+) (*) (QL)	Tree: Branching	Spreading	3	RC55	30	VG
		Semi upright	5	RC M9, RC M12		
		Upright	7	RC M17, RC M7		
2. (+) (QL)	Bark texture	Smooth	1	RC M14, RC M17	30	VG
		Rough	9	RC M12, RC M14		
3. (+) (QL)	Bark splitting	Longitudinal splits	1	RC 44, RC 65	30	VG
		Flakes	3	RC 88		
4.(+)	Bark colour	Grey white (RHS	1	RCM17, RCM12	30	VG

(QL)		156-B)				
		Grayed Green (RHS 197-A)	3	RC M9		
5. (+) (QL)	Scar shape	Elliptic	3	RC M8, RC M7	30	VG
		Heart shaped	5	RC M3, RCM5		
6. (*) (QN)	Scar length (cm)	Short (≤2.0 cm)	3	RC AL5	30	MS
		Long(>2.0 cm)	7	RC AL2		
7. (*) (QN)	Scar width (cm)	Narrow (≤2 cm)	3	RC M3, RC M7	30	MS
		Broad (>2 cm)	7	RC M6, RC M12		
8. (+) (QN)	Leaf let length (cm)	Short (<8 cm)	3	RC M7, RC M6	10	MS
		Medium (8-15 cm)	5	RC M8, RC M2		
		Long (>15cm)	7	RC AL2, RC AL5	30	
9. (+) (PQ)	Leaf let tip	Acute	1	RC M17	30	VG
		Subacute	3	RC M16		
10.(+) (PQ)	Leaf let base	Acute	1	RC M7	30	VG
		Oblique	3	RC M14		
		Rounded	5	RC I2, RC I7		
11. (+) (QL)	Leaf let arrangements	Subopposite	1	RC I7	30	VG
		Opposite	9	RC I1, RC I6		
12. (+) (*) (QL)	leaf let terminal arrangement	Paripinnate	1	RC M6	30	VG
		Imparipinate	9	RCM8		
13. (+) (*) (QL)	Leaflet petiole	Absent	1	RCA6	30	VG
		Present	9	RC I2, RC I7		
14. (+) (*) (QN)	Leaflet petiole length (cm)	Short (<0.5 cm)	3	RC I7	30	MS
		Medium (0.5-1.5 cm)	5	RC I6		
		Long (>1.5 cm)	7	RC I12		
15. (+) (QN)	Leaflet rachis Length (cm)	Small (<50cm)	3	RCM5	30	MS
		Medium (50-75 cm)	5	RCM3		
		Large (>75cm)	7	RCM6, RCM7		
16. (+) (QL)	Leaflet lamina base shape	Symmetrical	1	RC I2, RC I1	30	VG
		Asymmetrical	9	RC M3, RC I20		
17. (+) (PQ)	Leaflet colour	Light green (RHS Code 140 A)	1	RC M6	30	VG
		Dark green (RHS Code 137-A)	3	RCI12, RC,M7		

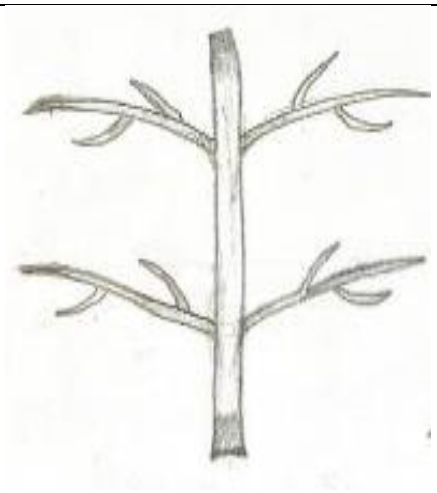
18. (+) (QL)	Types of Stipule	Caducous	3	RC I2, RC M6	10	VG
		Persistent	5	RC M12		
19. (+) (*) (QL)	Stem Straightness	Straight	1	RC 44, RC 56	50	VS
		Crooked	9	RC 34		
20. (+) (QL)	Stem Clear Bole Height	Short (< 40 % of tree height)	3	RC 75, RC 22	50	VS
		Medium (40 to 60% of tree height)	5	RC 108		
		Long (> 60% of tree height)	7	RC 92		
21. (+) (QL)	Stem knot	Absent	1	RC65, RC42	30	VG
		Present	9	RC,M17.RC,M18		
22. (+) (PQ)	Flower colour	Light yellow (RHS 8C)	3	RC88, RC44	50	VG
		Pale yellow (RHS 8D)	5	RC25		
		Yellow (RHS 8A)	7	RC22		
23. (+) (*) (QL)	Flower Merosity	Pentamerous	3	RC52, RC82	50	VG
		Hexomerous	5	RC83, RC56		
24.(*) (QN)	Flower length (cm)	Small (≤0.5 cm)	3	RC35, RC34	50	MS
		Large (>0.5 cm)	7	RC42		
25. (+) (*) (QN)	No. of Flowers in inflorescence	Low (<30 numbers)	3	RC80, RC28	50	MG
		Medium (30-60 numbers)	5	RC65, RC77		
		High >60 numbers)	7	RC52, RC35		
26. (*) (QL)	Flower form	Unisexual	1	RC55, RC60	50	VG
		Bisexual	9	RC52		
27. (*) (QN)	Pedicel Length (cm)	Short (≤ 1.0 cm)	3	RC22	50	MS
		Long (>1.0 cm)	7	RC88		
28. (+) (QN)	Peduncle Length (cm)	Short (≤4.0 cm)	3	RC32, RC55,	50	MS
		Long (>4.0 cm)	7	RC 35		
29. (+) (QN)	Fruit size (cm)	Small (≤5.0 cm)	3	RC65, RC94	60	MS
		Large (>5.0 cm)	7	RC78, RC94		
30. (+) (*) (QL)	Fruit shape	Lanceolate-Twisted	3	RC62, RC25	60	VG
		Lanceolate-Straight	7	RC44		
31. (+) (QL)	Fruit tip	Acute	3	RC25	60	VG
		Acuminate	5	RC43, RC52		

VIII. Explanations for the Table of characteristics

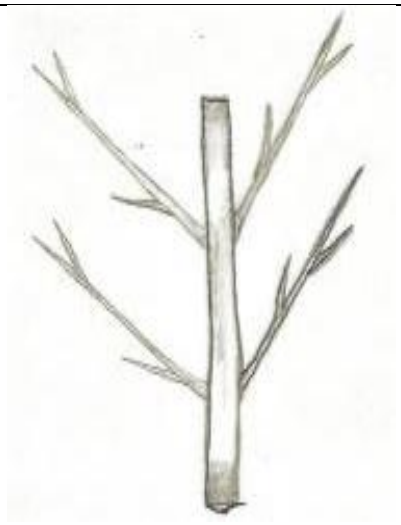
Characteristic 1: Tree Branching



Spreading
(3)

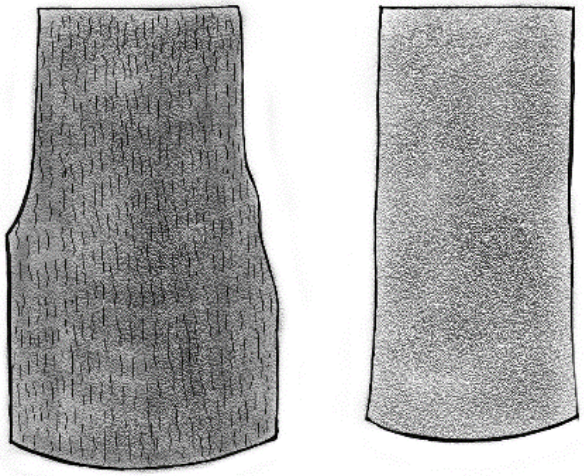


Semi upright
(5)

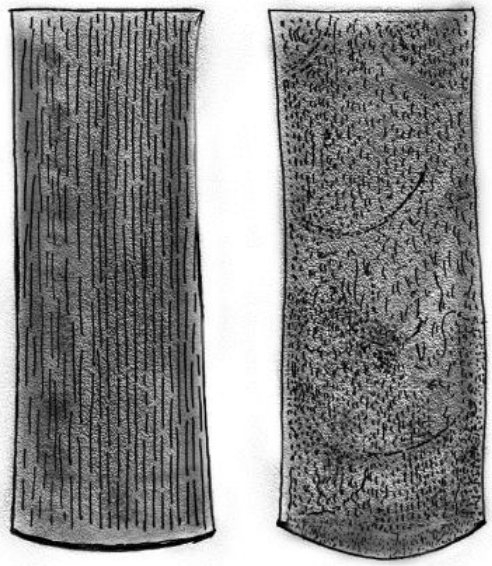


Upright
(7)

Characteristic 2: Bark Texture



Smooth
(1)



Rough
(9)

Characteristic 3: Bark Splitting

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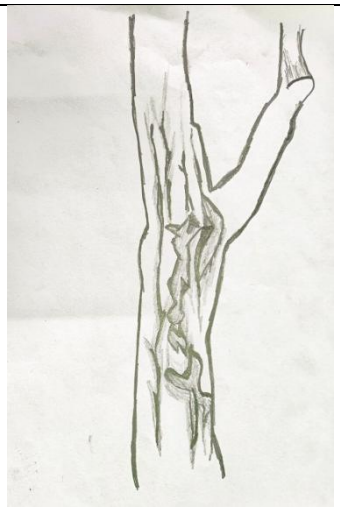
<tr><td>  </td><td>  </td></tr>
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(3)</td></tr>
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Characteristic 4: Bark Colour

Grey white (RHS code 156-A)
(1)

Grayed Green (RHS code 197-A)
(3)

Characteristic 5: Scar shape

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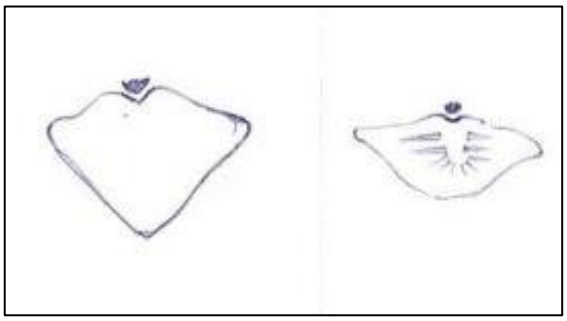
<tr><td>  </td><td>  </td></tr>
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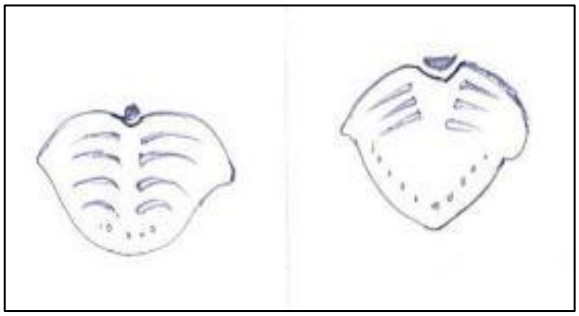
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Heart shaped
(5)</td></tr>
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Characteristic 8: Leaflet length


Short (3)

Medium (5)

Long (7)

Characteristic 9: Leaflet Tip

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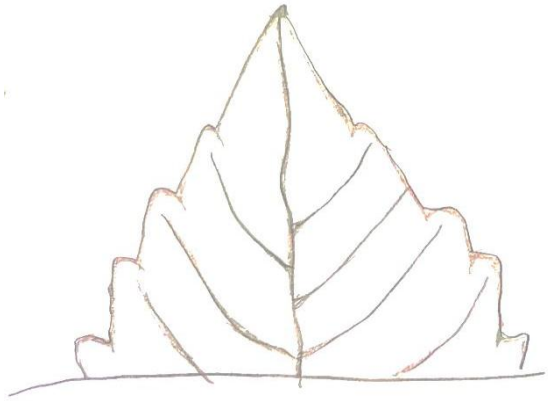
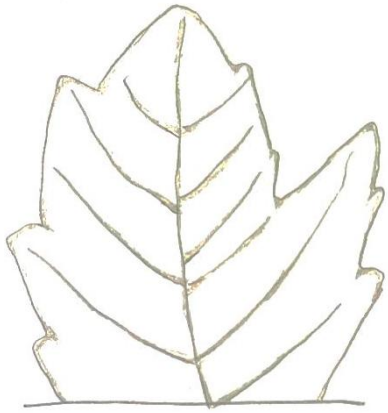
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Acute
(1)</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Subacute
(3)</td></tr>
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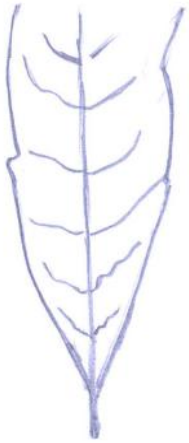
Characteristic 10: Leaflet Base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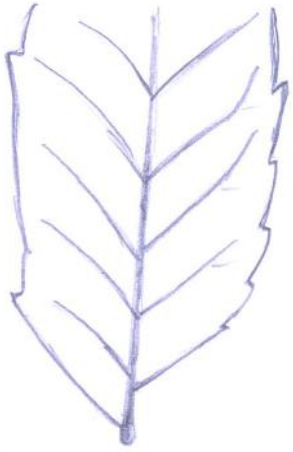
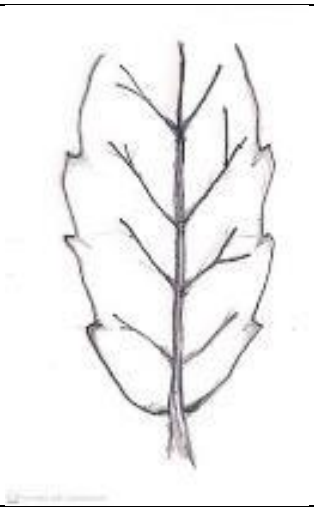
	
Oblique (3)	
	
Rounded (5)	

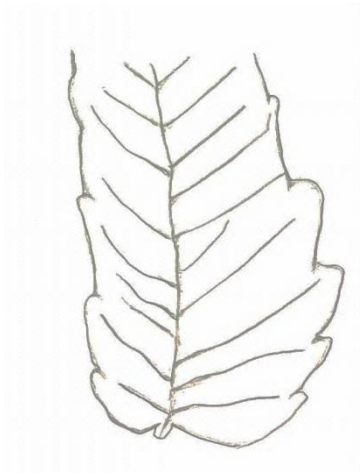
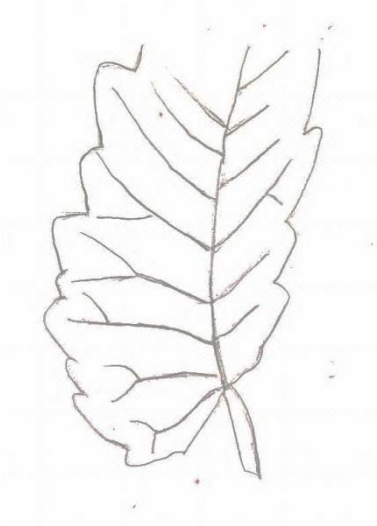
Characteristic 11: Leaflet arrangement

	
Subopposite (1)	
	
Opposite (9)	

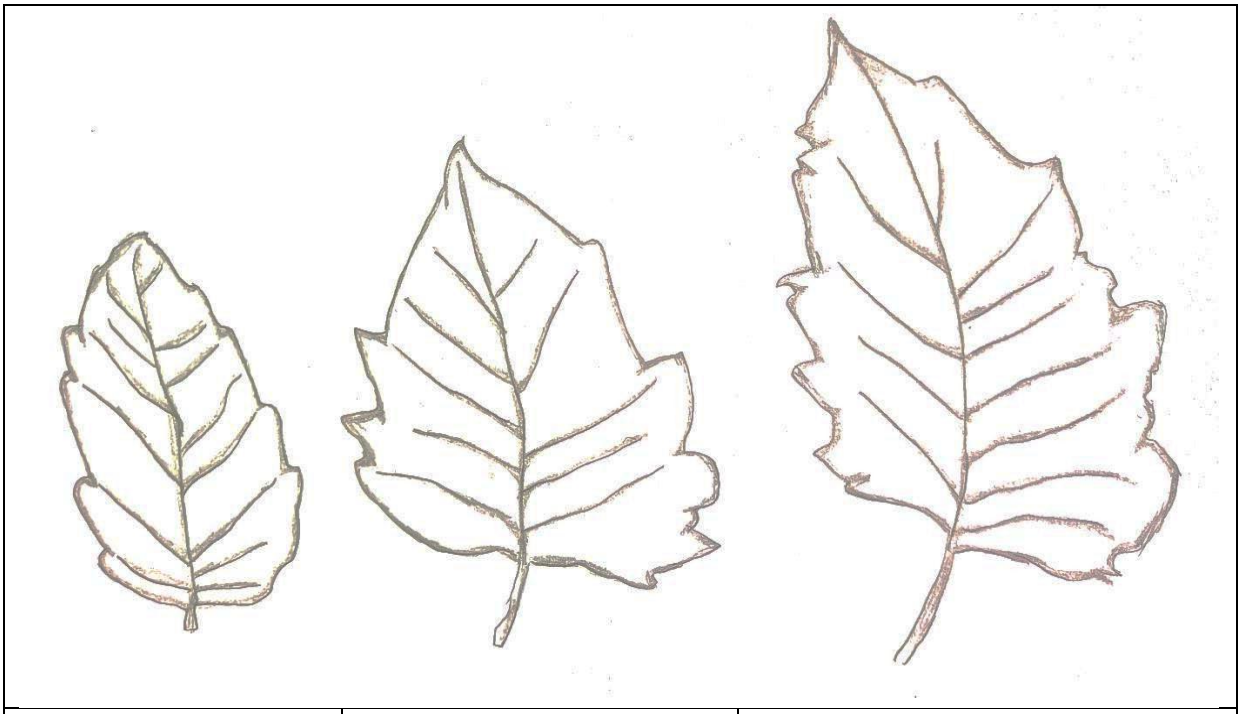
Characteristic 12: Leaflet terminal Arrangement

	
Paripinnate (1)	
	
Imparipinate (9)	

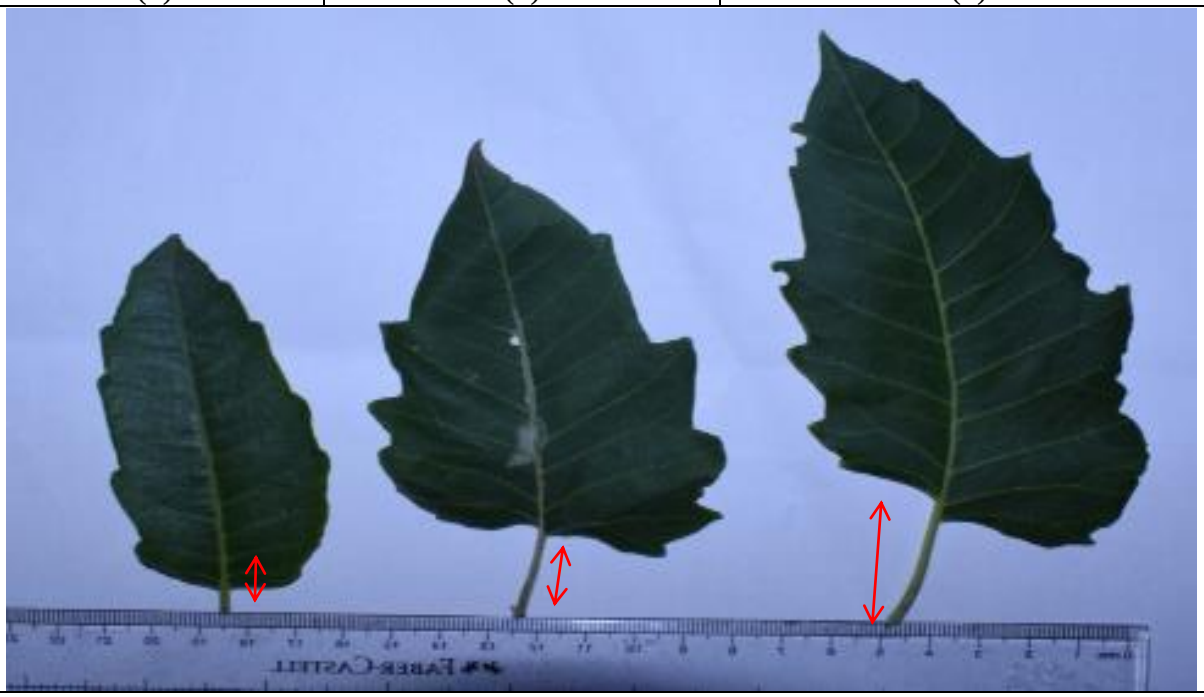
Characteristic 13: Leaflet Petiole

	
Absent (1)	
	
Present (9)	

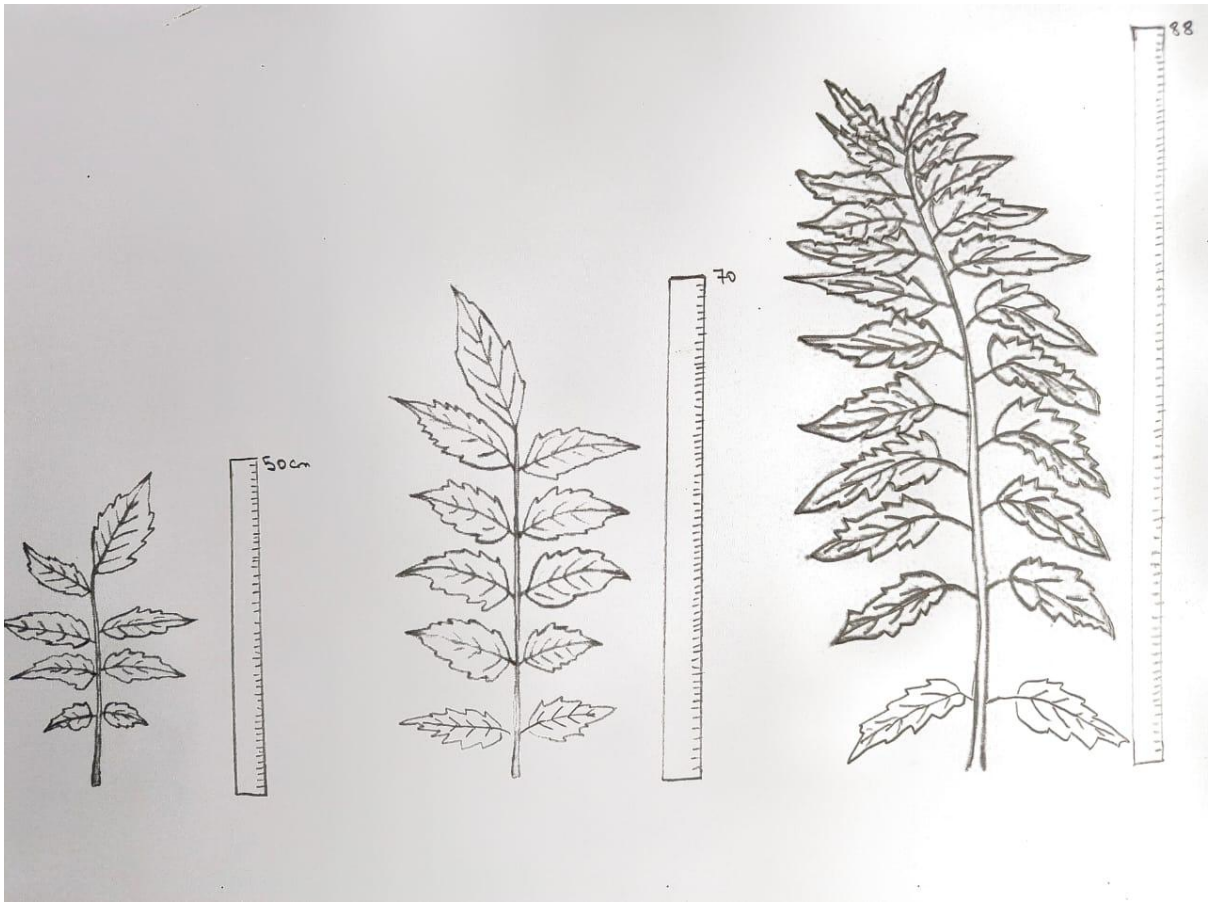
Characteristic 14: Leaflet Petiole length



short (<0.5 cm) (3)	Medium (0.5-1.5 cm) (5)	Long (>1.5 cm) (7)



Characteristic 15: Leaf rachis length



Small (3) **Medium (5)** **Large (7)**

Characteristic 16: Leaflet Laminabase shape

	
Symmetrical (1)	
	
Asymmetrical (9)	

Characteristic 17: Leaflet colour

Light green
(1)

Dark green
(3)

Characteristic 18: Types of Stipules

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Caducous
(3)</td></tr>
<tr><td>  </td><td>  </td></tr>
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(5)</td></tr>
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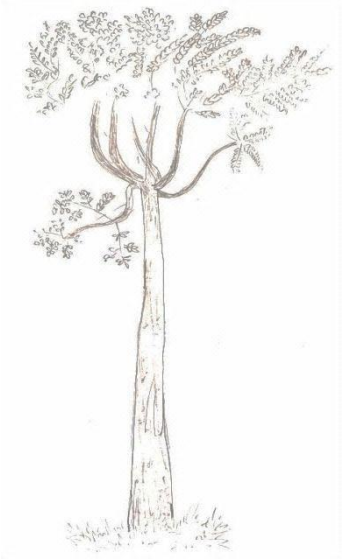
Characteristic 19: Stem Straightness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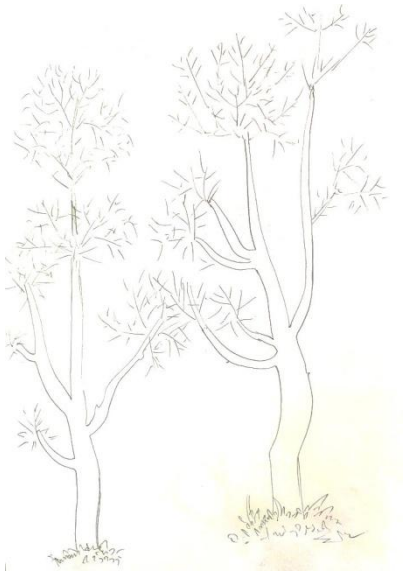
	
Crooked (9)	

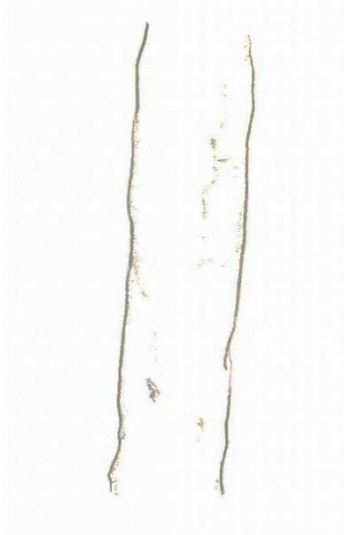
Characteristic 20: Stem clear bole height

Short <40%

Medium (40-60%)

Long >60%)

Characteristic 21: Stem Knots

	
Absent (1)	
	
Present (9)	

Characteristic 22: Flower colour

Light Yellow (RHS 8C)

(3)

Pale Yellow (RHS 8D)

(5)

Yellow (RHS 8A)

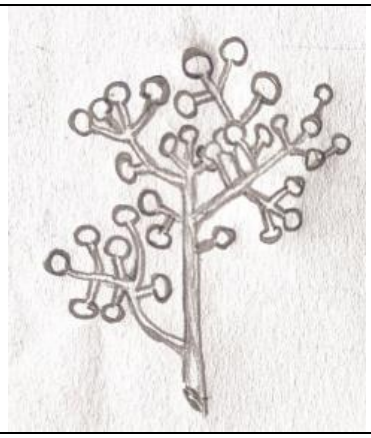
(7)

Characteristic 23: Flower Merosity

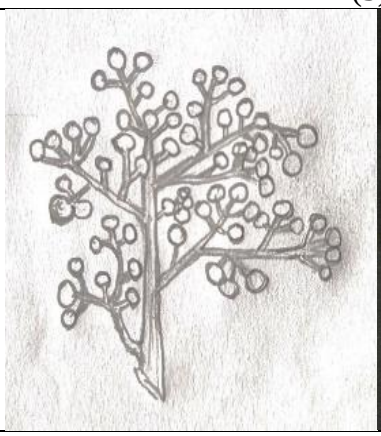
Pentamerous
(3)

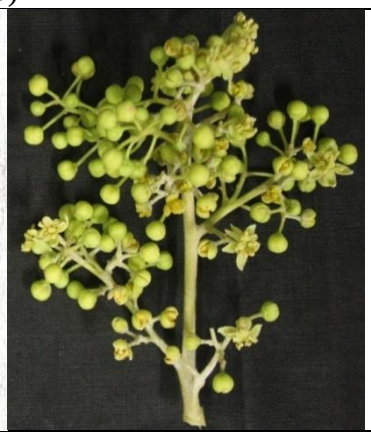
Hexomerous
(5)

Characteristic 25: No. of Flowers in inflorescence

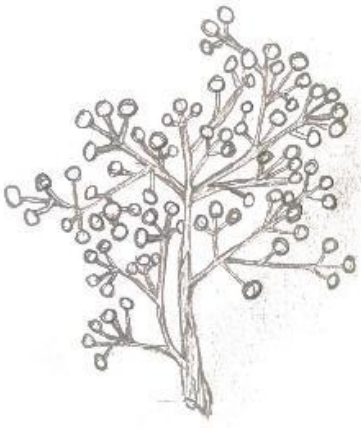


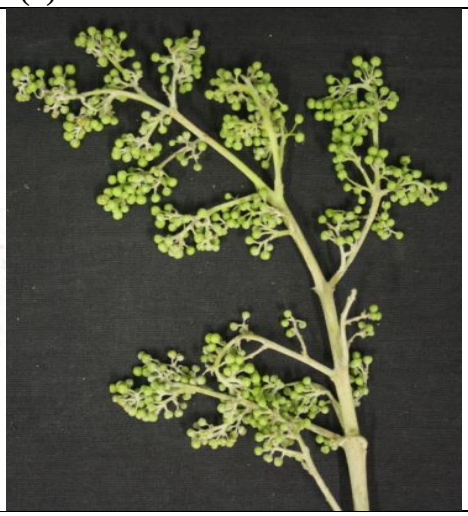
low (<30 numbers)
(3)





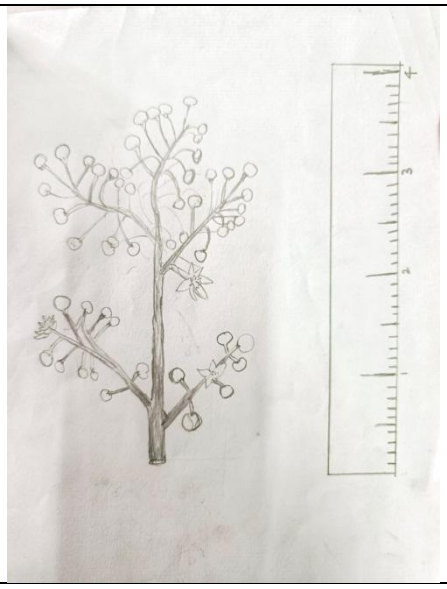
Medium (30-60 numbers)
(5)



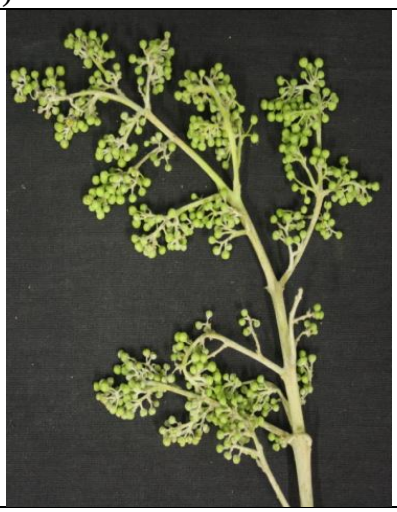


High (>60 numbers)
(7)

Characteristic 28: Peduncle Length

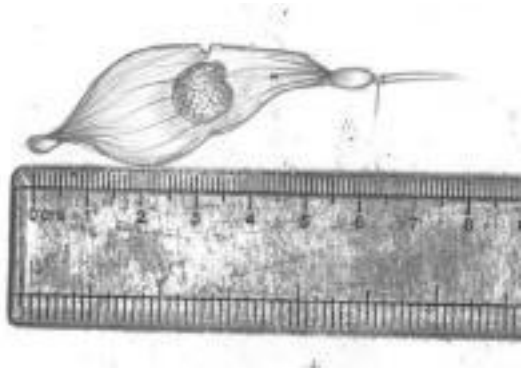
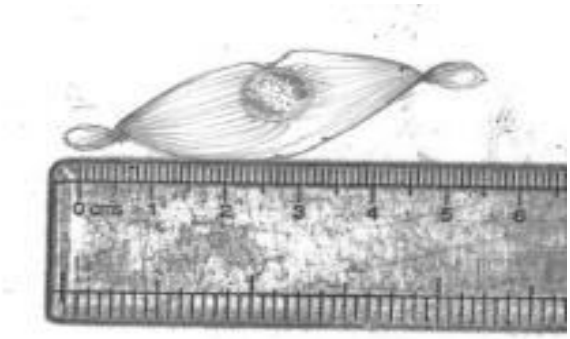


Short
(3)



Long(7)

Characteristic 29: Fruit size

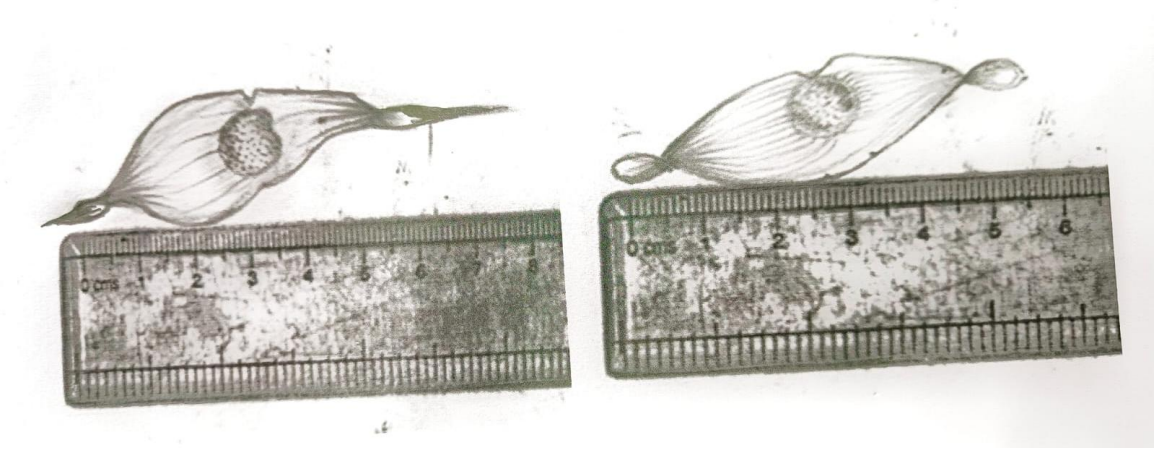
	
Small (≤5 cm) (3)	
	
Large (>5 cm) (7)	

Characteristic 30: Fruit shape

Lanceolate- Twisted
(3)

Lanceolate- Straight
(7)

Characteristic 31: Fruit tip



Acute (3)

Acuminate (5)

IX. Working group details

The DUS Test Guideline is developed by the Institute of Forest Genetics and Tree Breeding, Coimbatore and the below given Task Force (1/2020) constituted by the PPV&FR Authority for Ailanthus (*Ailanthus excelsa.* Roxb.).

The Members of the Task Force

1.	**Dr. K. Planisamy** Scientist –G (Retd.), Institute of Forest Genetics and Tree Breeding (IFGTB), (ICFRE), Coimbatore	Chairman
2.	**Dr. B. Nagarajn** Scientist –G (Breeder), Institute of Forest Genetics and Tree Breeding (IFGTB), (ICFRE), Coimbatore.	Member
3.	**Dr. U. K. Tomar** Scientist –F (Breeder) (Rtd), Arid Forest Research Institute, ICFRE.	Member
4.	**Dr. P. Masilamani,** Dean, Anbil Dharmalingam Agricultural College & Research Institute, (TNAU), Trichy.	Member
5.	**Anup Chandra** (Taxonomist) Scientist- F Forest Research Institute, Dheradun..	Member
6.	**Dr. Ravi Prakash** PPV&FRA, Member Secretary	Member secretary

Nodal Officer

1. Dr. D. Rajasugunasekar , Scientist, IFGTB, Coimbatore.

Nodal centre
Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore, 641 002

Annexure -1

Maintenance of *Ailanthus excelsa* in field Plantation management

- The recommended spacing of Ailanthus excels 3X3m (optimal) or 5X5m (Ideal).
- Suggested pit sixe is 60 cm^3
- The tree grows well in sandy loam, red and lateritic soil with an annual rainfall of 600mm and above.
- Growth is enhanced with applications of fertilizers.
- Regular irrigation is required for fast growth of the trees. Initial growth can be hastened with daily watering and application of fertilizers once in three months for first three years.
- Water logging is to be avoided as it may enhance the species susceptibility to fungal attacks.
- Regular weeding should be carried out to avoid weeds competing with trees for nutrients and water, especially during the initial stages.

Fertilizer requirements

Application of N, P, K mixture of 25-50 g per tree, two times in a year help to augument the growth. The fertilizer requirements can be scheduled on need basis depending on the growth and development of the Tree.

Insects and Pests

Defoliators (*Eligma narcissus*) and web worm (*Atteva fabriciella*) causes severe damage the plants in the early stages. Application of pesticides should be done only based on the recommendations of the expert. It is essential to follow the management prescription of the expert strictly.