Lecture # 4

Forest Pathology

Dr. Amit Pandey
Head & Scientist G
Forest Protection Division
Forest Research Institute
Dehradun

Phytosanitary Certification

Vietnam

Mongolia

China

South Korea

Bhutan

Nepal

Thailand


चक्रमण-स्थल


चंक्रमण-स्थल
SILENCE
DONATION
BOX
CAT


चक्रमण-स्थल
भगवान बुद्ध ने इस स्थान पर ध्यानस्थ चक्रमण करते हुये तीसरा सप्ताह बिताया था। सफेद पत्थर पर जो कमल चिन्ह दिखलाई पड़ रहे हैं वे उन स्थानों का संकेत करते हैं जहाँ चक्रमण करते हुए उनके चरण पड़े थे।


NOTICE


कृपया शांति बनाये रखें।
PLEASE KEEP
SILENCE


SILENCE


SILENCE


EMERGENCY EXIT
GATE NO.
3
GATE NO.
3


十方法界聖凡水陸普度大齋勝會
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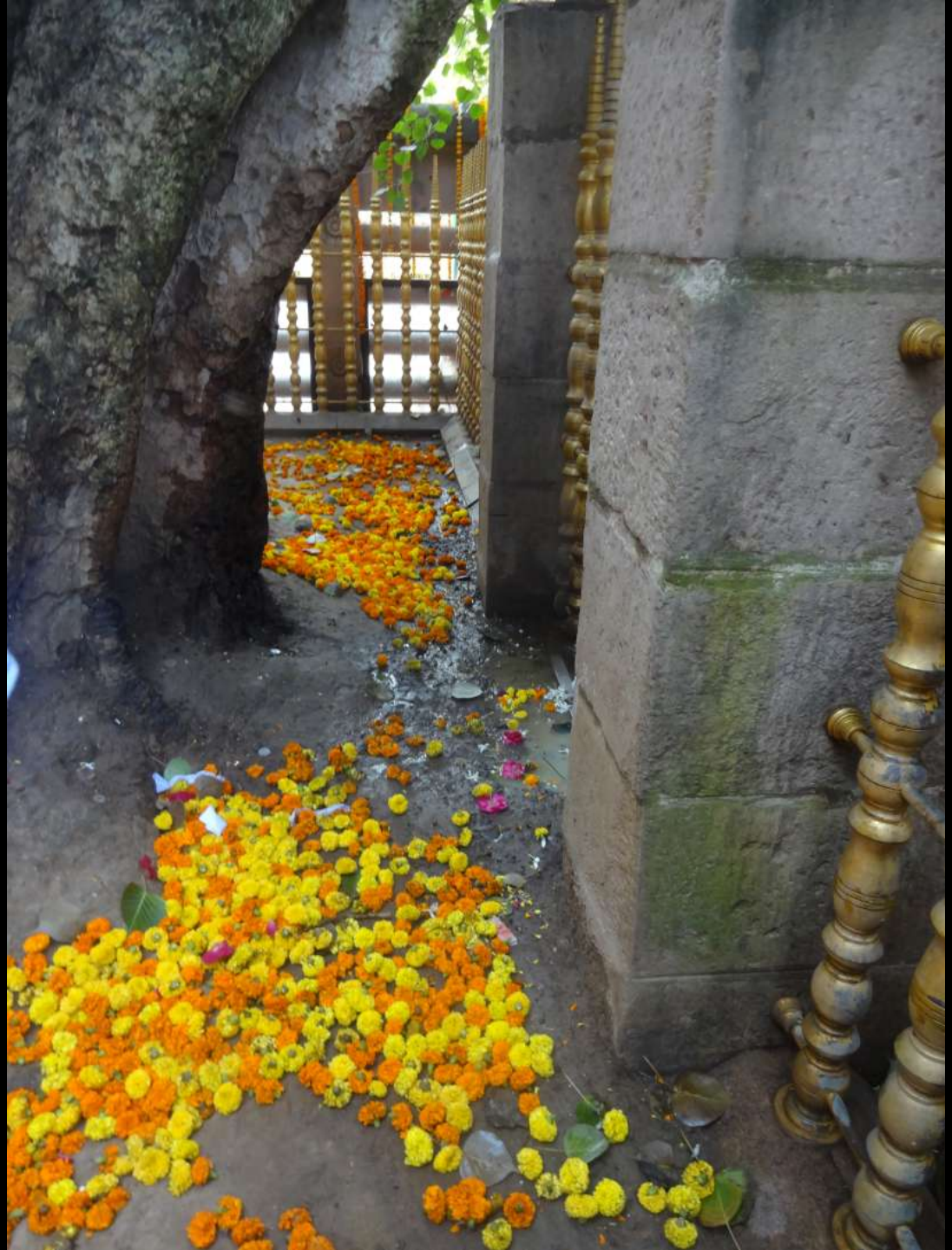
IWLBC
國際水陸
2018年印度菩提伽耶第九
9th International Water-La
水陸法会
南传坛




BTC


SILENCE


BTMC


B.T.M.C
G16


WTMC

30th Nov. 2018 Work done / Observations

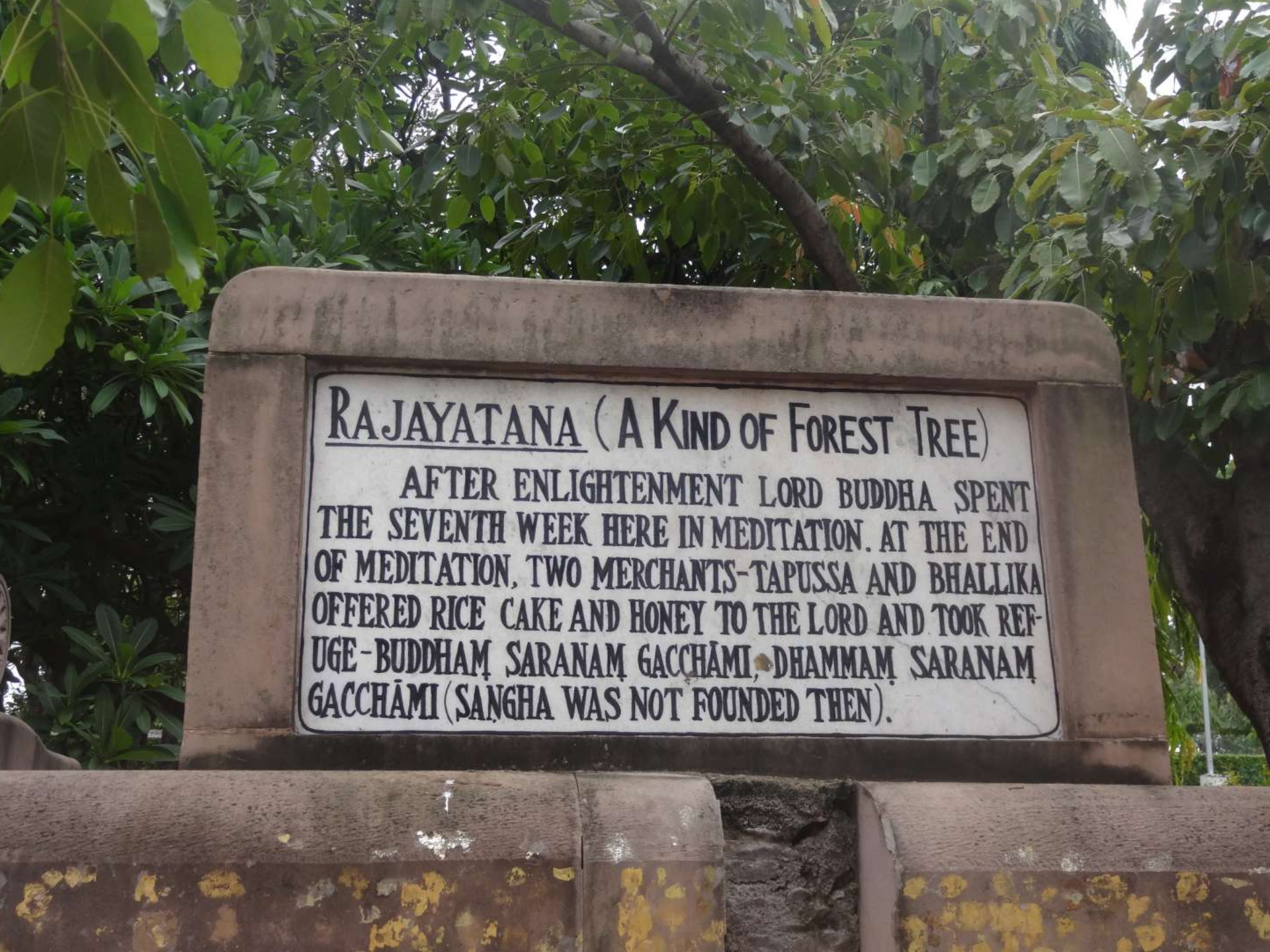
The holy Bodhi tree was examined & observed followed by collection of two foliar samples by Dr Amit Pandey, Scientist G & Dr. Sudhir Singh, Scientist G along with the Member Secretary, BTMC, Chief Fire Officer, the BTMC Member, Dr. Mahasweta Maharathi & other BTMC officials. The holy Bodhi tree was in good health. Following observations were made.

1. The holy tree is attaining good form with time. However, heavier branches showing downward growth needs to be partially pruned in February, 2019 (winter) in order to reduce the weight on the lanky branches.
2. Some of the props need rubber pad replacement as some rubber pads are damaged.
3. Exposed roots of the holy tree near collar region needs to be slightly covered with soil. The bark in the collar region showing some flaking and other earlier wounds need to be again pasted with Chaubatia paste. The paste has been handed over to BTMC staff as currently heavy influx of pilgrims made it difficult to administer treatment. It will be done later.

Above was also briefed to BTMC chairman members in meeting today.

30.11.2018
(DR. AMIT PANDEY)
Scientist G
Forest Pathology Discipline
Forest Research Institute, Dehradun

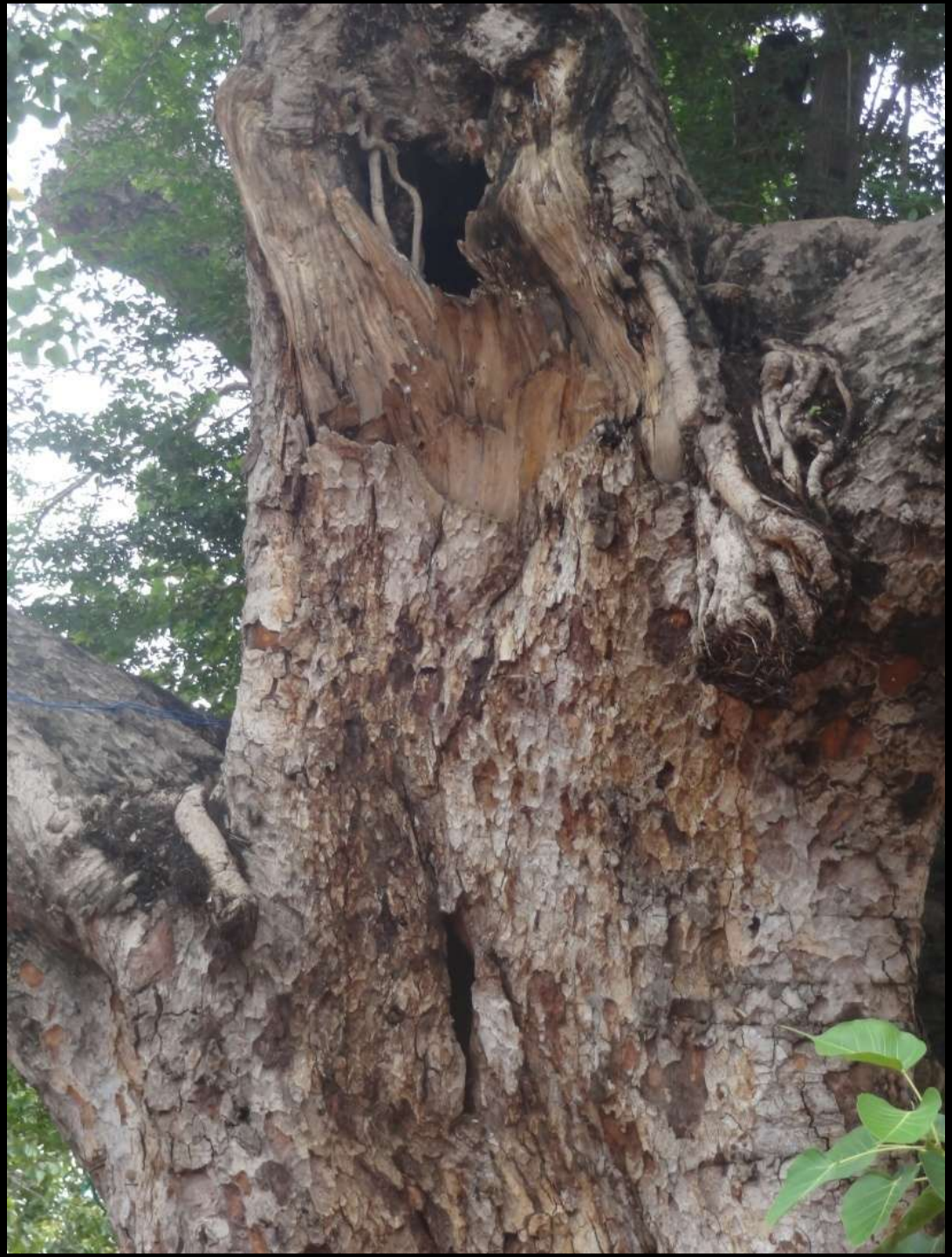
30/11/2018
(Dr. Sudhir Singh
Scientist-G, Forest Entomology
Discipline, FRI, Dehradun)

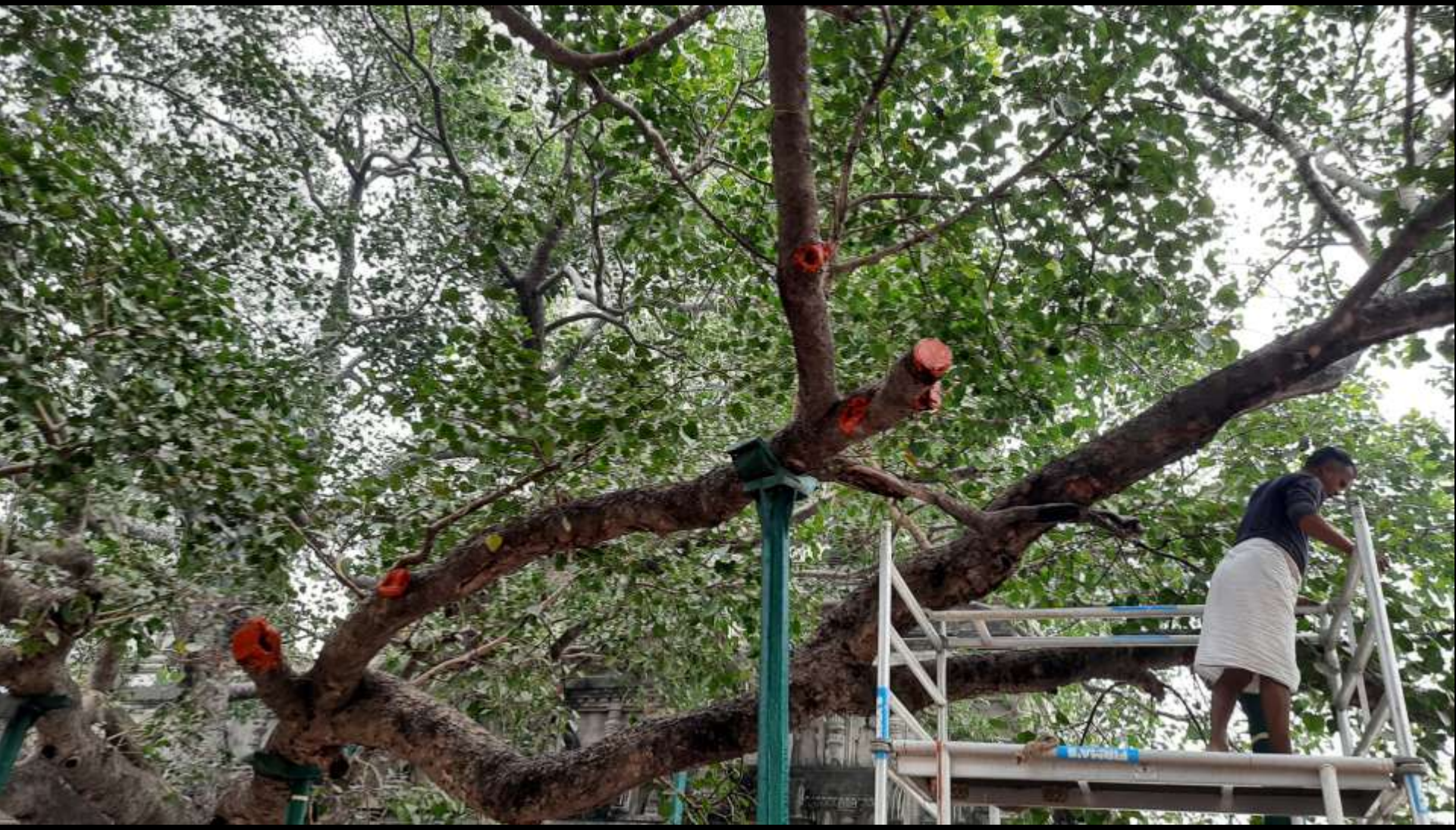

RAJAYATANA (A KIND OF FOREST TREE)
AFTER ENLIGHTENMENT LORD BUDDHA SPENT THE SEVENTH WEEK HERE IN MEDITATION. AT THE END OF MEDITATION, TWO MERCHANTS-TAPUSSA AND BHALLIKA OFFERED RICE CAKE AND HONEY TO THE LORD AND TOOK REFUGE-BUDDHAṂ SARANAṂ GACCHĀMI, DHAMMAṂ SARANAṂ GACCHĀMI (SAṆGHA WAS NOT FOUNDED THEN).


MEDITATION PARK ENTRY FEE
VISITORS : RS.20/-PER PERSON - MEDITATORS: RS. 25/- PER PERSON
ENTRY TIME : 10 A.M. TO 5 P.M.- TIME: 5-10A.M. & 5-9 P.M.
(A) ENTRY FEE FOR VISITORS IS VALID MAXIMUM 30 MINUTES
(B) CHILDREN UPTO 10 YEARS. OLD ALLOWED WITH GUARDIAN
(C) PLEASE CO-OPERATE TO MAINTAIN THE PARK CLEAN
These Premises are under CCTV Surveilance
यह क्षेत्र सी. सी. टी. वी. कैमरे की निगरानी में है।


मुचलिंद सरोवर (6वा सप्ताह)
Muchalinda Sarovar (6th Week)


BTMC






GAYA AIRPORT


POST – ENTRY QUARANTINE
FOR BO TREE SAPLING

Permits for Import of plants, plant products etc.

- No consignment to be imported into India without a valid permit
- No categories of plant materials in respect of the plant species or variety mentioned in Schedule-IV shall be allowed to be imported into India from the countries mentioned against each in column (4) of the said Schedule.
- One copy of import permit shall be forwarded to the exporter in advance to facilitate incorporation of import permit number in the phytosanitary certificate issued by the exporting country.

- No import permits shall be issued for consignments other than those listed in Schedule-V, VI and VII, unless the pest risk analysis (PRA) is carried out in accordance with the guidelines issued by the Plant Protection Adviser (PPA). The process of PRA involves the categorization of pests associated with the commodity into quarantine pests; evaluation of their introduction potential; critical assessment of economic and environmental impact of their introduction; and specification of risk mitigating measures against them. The completion of PRA process may involve the visit of 5 phytosanitary experts to the country of export to carry out pre-shipment inspections, evaluate post–harvest treatment technologies and quarantine inspection and certification facilities.
- No consignment of seed or grain shall be permitted to be imported with contamination of quarantine weeds

- All the consignments of plants and plant products and other regulated articles shall be imported into India only through ports of entry as specified in Schedule-I
- On arrival, at the first point of entry the consignment shall be inspected by the Plant Protection Adviser and appropriate samples shall be drawn for laboratory testing
- The Plant Protection Adviser after inspection and laboratory testing, fumigation, disinfection or disinfestation, as may be considered necessary by him, accord quarantine clearance for the entry of a consignment or grant provisional clearance for growing under post-entry quarantine, as the case may be or order deportation or destruction of the consignment in the event of non-compliance with the restrictions and conditions specified in this Order.

- Where fumigation or disinfestation or disinfection is considered necessary in respect of a consignment the importer shall on his cost arrange for the fumigation, disinfection or disinfestation through an approved agency
- Plants and plant products intended for other countries shall not be allowed transit through or transshipment at air or sea ports or land customs stations, unless they are packed so as not to permit spillage of material or contamination with soil or escape of any pest, and subject to the condition that the package or container shall not be opened or seals are broken any where in India
- No consignment shall be permitted import unless accompanied by a Phytosanitary Certificate issued by an authorized officer at the country of origin or at the country of re-export

- No consignment packed with the packaging material specified in clause 2(xiii) shall be permitted import unless appropriately treated. The treatments shall include heat-kiln treatment at 560° C for a minimum of 30 hrs or Methyl Bromide fumigation at 48 g/cum for 32 hours or chemical impregnation of wood with wood preservatives such as copper chrome arsenic or any other approved treatment as per international standards and the treatment shall be endorsed in phytosanitary certificate.

- No article packed with packaging materials shall be released by the officers of customs unless the consignment is accompanied by a phytosanitary certificate in respect of said packing material
- If no phytosanitary certificate is furnished in respect of said packaging material, the officer of customs shall grant out of charge only after clearance is obtained from local plant quarantine authorities, who shall grant clearance from the quarantine angle and may, if deemed fit, subject the said packaging material to treatment at the expense of importer

Post–entry Quarantine

- Plants and seeds, which require post-entry quarantine as laid down in Schedule V and VI, shall be grown in post-entry quarantine facilities duly established by importer at his cost
- The inspection authority shall inspect the plants grown in the approved post-entry quarantine facility at such intervals as may be considered necessary with a view to detect any pests and advise necessary phytosanitary measures to contain the pests.
- The inspection authority shall permit the release of plants from post-entry quarantine, if they are found to be free from pests and diseases for the period specified in the permit for importation.

- Where the plants in the post-entry quarantine are found to be affected by pests and diseases during the specified period the inspection authority shall:-

  (i) order the destruction of the affected consignment of whole or a part of the plant

  population in the post-entry quarantine if the pest or disease is exotic, or

  (ii) advise the importer about the curative measures to be taken to the extent necessary, if the pest or disease is not exotic and permit the release of the affected population from the post-entry quarantine only after curative measures have been observed to be successful.Otherwise, the plants shall be ordered to be destroyed.

Permit for import of timber

(1) No consignment of timber shall be permitted import unless the following conditions and requirements are met with, namely:-

(a) The timber shall be stripped off its bark, either be squared or rounded and accompanied by an official statement that the wood has been appropriately fumigated/treated and such treatment shall be endorsed in the phytosanitary certificate issued at the country of origin or re-export, as the case may be;

(b) The timber shall be marked ‘kiln-dried’ or with any internationally recognized mark.

(2) All the consignments of timber shall be inspected on board prior to unloading at the port of arrival by an officer duly authorized by PPA and, if necessary, fumigated/treated on board before unloading.

Provided that the above conditions shall not apply for containerized cargo, which shall be inspected by an authorized PQ officer after unloading of the containers from the ship at the port/container freight station or Inland Container Depots under the jurisdiction of concerned Plant Quarantine Station.

The Phaseout of Methyl Bromide

- Methyl bromide (MeBr) is an odorless, colorless gas that has been used as a soil fumigant and structural fumigant to control pests across a wide range of agricultural sectors. Because MeBr depletes the stratospheric ozone layer, the amount of MeBr produced and imported in the U.S. was reduced incrementally until it was phased out in January 1, 2005, pursuant to our obligations under the *Montreal Protocol on Substances that Deplete the Ozone Layer* (Protocol) and the Clean Air Act (CAA).

- Allowable exemptions to the phaseout include 1) the Quarantine and Preshipment (QPS) exemption, to eliminate quarantine pests, and 2) the Critical Use Exemption (CUE), designed for agricultural users with no technically or economically feasible alternatives.
- The Quarantine and Preshipment (QPS) rule implements an allowable exemption for production and consumption of methyl bromide, for quarantine and preshipment purposes.

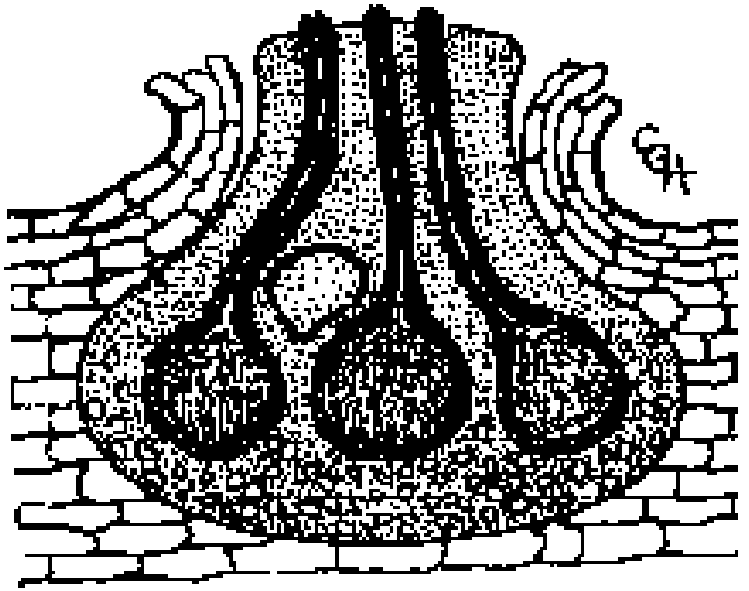
Timber logs

Chest nut (*Castanea* spp)	Logs with bark	Freedom from: (a) Chest nut blight (*Cryphonectria parasitica*)- American strain	The timber shall be fumigated with Methyl bromide @ 32 gm/cu. m at 28 o C and above under NAP or kiln drying as the case may be at the country of origin and treatment shall be endorsed on phytosanitary certificate or by any other fumigant/ substance in the manner approved by the PlantProtection Adviser for this purpose.

Elm (*Ulmus* spp)	Logs with bark	Freedom from: (a) Dutch elm disease (*Ceratocystis ulmi*)- American & European strains (b) Elm bark beetle (*Scolytidae*)	Same as above
Oak (*Quercus* spp)	Logs with bark	Freedom from: (a) Oak wilt (*Ceratocystis fagacearum*) (b) Oak bark beetles (*Pseudopityopthorus spp*)	Same as above
Pine wood (*Pinus* spp)	Logs with bark	Freedom from: (a) Branch and trunk cankers (*Atropellis piniphila, A. pinicola*) (b) Pine wood nematode (*Bursaphelenchus xylophilus*) (c) Cerambicid vector (*Monochamus spp.*) (d) Pine beetles (Scolytidae) and pine weevils (*Pissodes spp.*) (e) Sirex wasp (*Sirex spp*)	Same as above

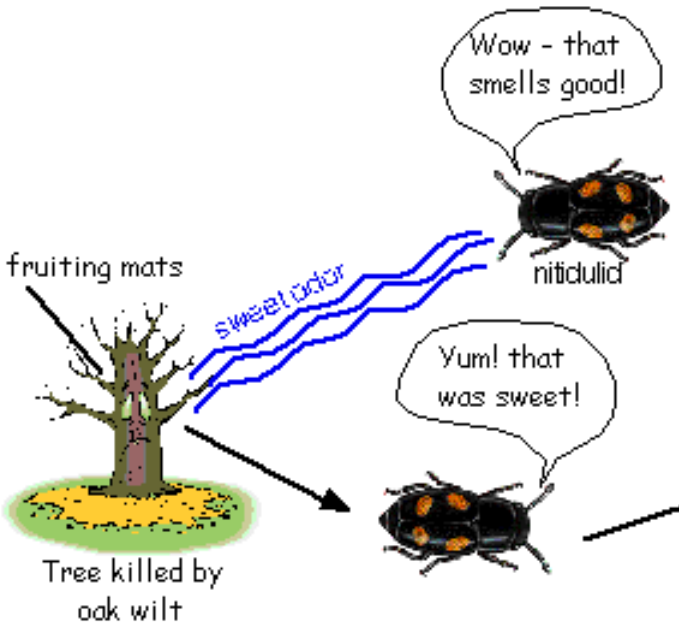
Chestnut blight

- *Cryphonectria parasitica*
- The chestnut blight was accidentally introduced to North America around 1900-1908, either in imported lumber or in imported chestnut trees, and by 1940, mature trees had been made virtually extinct by the disease.
- Introduced from either China or Japan



Oak wilt (*Ceratocystis fagacearum*)

Oak bark beetles (*Pseudopityopthorus spp*)



Pipal tree at Koteshwarnath dham

Vat Vriksha preservation and maintenance at Jyotsar, Kurukshetra

- Pathogen and insect pest
- Biotic stress
- Construction activities leading to root problems

Health Maintenance and upkeep of holy trees at Budhha Smriti Park, Patna

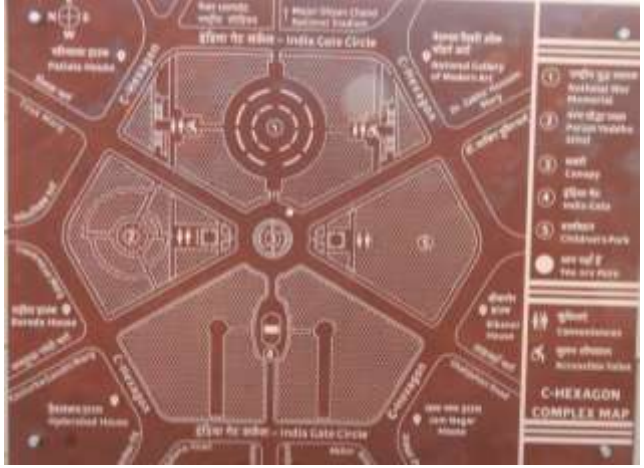
- Fungal infection, sap sucking insects, nutritional deficiency,
- Photostress

Health Status Assessment of the Trees in 'C' Hexagon Area near India Gate

by

Forest Research Institute

Dehradun



- Our research team examined 450 trees in C Hexagon area (National War Memorial, Param Yoddha Sthal and partially Children's Park) from 16th to 21st Jan 2019.
- The samples were collected and are being investigated.
- The final report on the tree health will be submitted in due course
- Some of the preliminary observations are given in this PPT

Root asphyxiation

- It can become difficult for the root of some trees to breathe (asphyxiation) as they are buried deep due to soil mounding done for landscaping.
- Stag head symptoms and leaf yellowing could be seen in some trees


Major portion of the tree trunk
buried due to soil mounding


Stag-head symptoms

Mechanical injuries

- Mechanical injuries caused by civil work and unscientific branch pruning
- Needs to be treated with suitable pesticides since the wounds serve as infection courts.


Injury due to
sharp edges


Support causing damage to bark

Heart rot

- The heart rot in main trunk and branches of trees need to be monitored
- Serious threat to life and property (hollow tree trunks and branches lose strength)
- The treatment is needed to prolong the tree life.


220


Hollow cavities in
tree trunk

Root rot

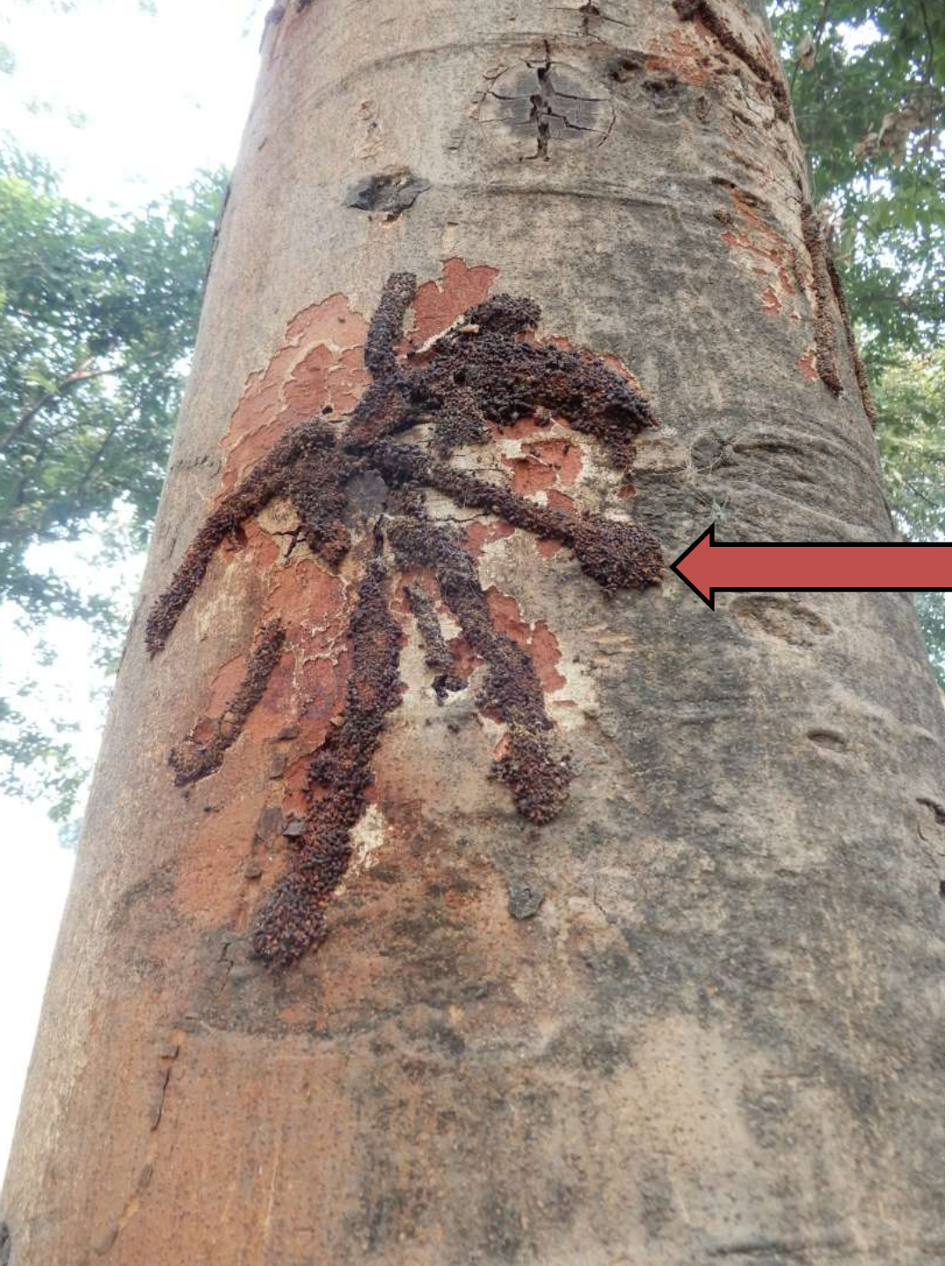
- *Ganoderma* sp infection was observed in one partially dead Gulmohar tree
- May spread to nearby Gulmohar trees as the disease spreads by root to root contact
- The pesticide treatment and silvicultural measures are needed to avoid further spread.


Sporophore of
rot causing
fungus
Ganoderma sp

Root damage due to electrical / civil works

- At some places the ground digging for electrical and civil works has damaged the tree roots
- Proper fertilization and pesticide treatment in needed
- Soil compaction due to concreting the ground below tree canopy causes asphyxiation

Some Jamun trees are being strangulated by parasitic angiosperm plants. These parasitic plants need to be removed.



Insect infection in Amaltas needs to be treated with appropriate insecticide

Major Problems of Urban Trees:

Restricted root space
Cracks and insect attack

Root Rot

Stem Decay

Harp branch
Poor Tree Architecture

Weak Branch Union

Cankers

	Major Roads	Species Name	Number of trees on both sides
1	**Udyan Path (V-3 Roads)**		
a	2-3	*Ficus infectoria*	19+22
b	11-10	*Ficus infectoria*	73+83
c	15-16	*Ficus infectoria*	81+84
d	24-23	*Ficus infectoria*	92+96
2	**Vidya Path (V-3 Roads)**		
a	38-37	*Alstonia scholaris*	92+100
b	40-41	*Alstonia scholaris*	103+120
3	**Paschim Marg (V-3 Roads)**		
a	39-40	*Enterolobium cyclocarpum*	65
4	**Sarovar Path (V-3 Roads)**		
a	5-6	*Pilkhan*	57+50
b	8-7	*Pilkhan*	60+85
c	18-19	*Pilkhan*	68+55
d	21-20	*Pilkhan*	68+67
5	**V-6 Road**		
a	Sector-5	*Sterculia alata*	54
b	Sector-10	*Grevillea robusta*	136
c	Sector-2A	*Grevillea robusta*	60
6	**V-5 Road**		
a	Sector-34C & D	*Terminallia bellerica*	134
b	Sector 37 ABCD	*Pterospermum*	159

Methodology

- Systematic sampling was done for data collection
- Following thirty parameters under four categories were taken for health assessment of selected trees
- According to the contribution of each parameter in making the tree hazardous, percent weightage was given
- Statistical analysis of collected data was done after data normalization

Weightage percentage to each category and parameter.

Category	Percentage
Root health	22
Stem health	35
Crown health	16
Cultural impact	20

Parameters studied for tree health assessment

Sr. no.	Parameter	Percentage	Sr. no.	Parameter	Percentage
A	**Root Health**		B.	**Stem Health**	
1	Digging activity	25	6	Sporophores	33
2.	Heaving by roots	10	7	Open wounds	17
3.	Sporophores presence	36	8	Heart Rot	25
4.	Stem girdling	10	9	Insect attack	5
5.	Canker on exposed roots	18	10	Gall	5
			11	Cracks	5
			12	Epicormic branches	5
			13	Exudation	5
C.	**Crown Health**		D.	**Cultural impact**	
14	Unscientific pruning	10	25	Leaning	10
15	Dead branches	7	26	Power line	5
16	Discoloration	5	27	Construction	15
17	Defoliation/ top dying	17	28	Soil mounding	25
18	Epiphyte	6	29	Soil erosion	20
19	Insect attack	8	30	Soil compaction/ tiling	25
20	Sporophore	14			
21	Epicormic branching	7			
22	Weak branch union/ weak fork	12			
23	Harp tree architecture /harp	10			

List of selected Characters for statistical analysis

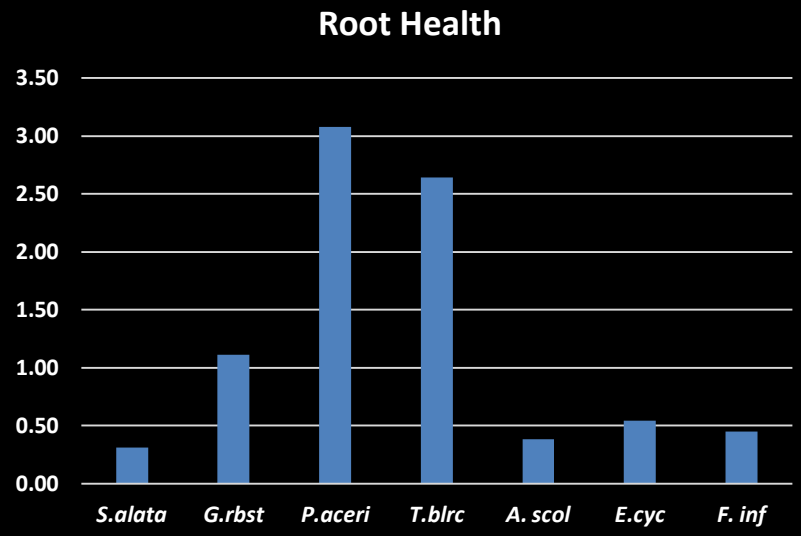
Sr. no.	Parameter	Percentage	Sr. no.	Parameter	Percentage
A	**Root Health**		**B.**	**Stem Health**	
1	Digging activity	25	3	Sporophores	33
2.	Sporophores presence	36	4	Open wounds	17
			5	Heart Rot	25
			6	Insect attack	5
C.	**Crown Health**		D.	**Cultural Impact**	
7	Unscientific pruning	10	12	Soil mounding	25
8	Defoliation/ top dying	17	13	Soil erosion	20
9	Sporophore	14	14	Soil compaction/ tiling	25
10	Weak branch union/ weak fork	12			
11	Harp tree architecture /harp branches	10			

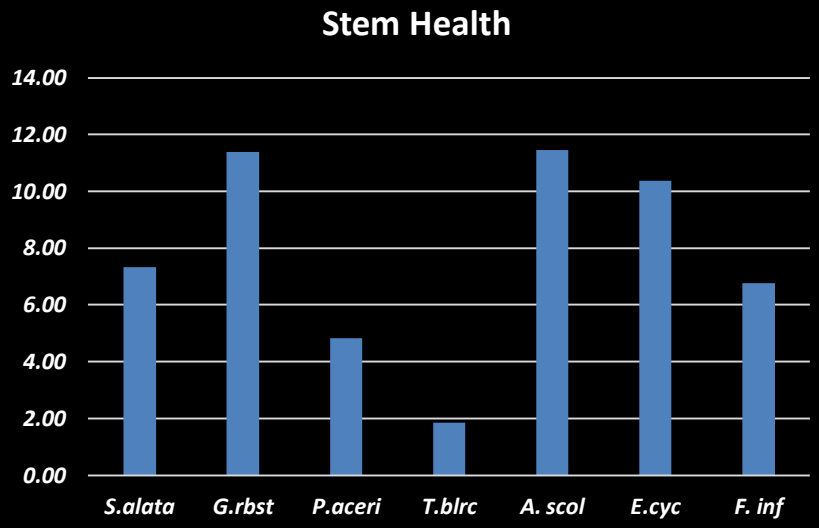
Results and Discussions

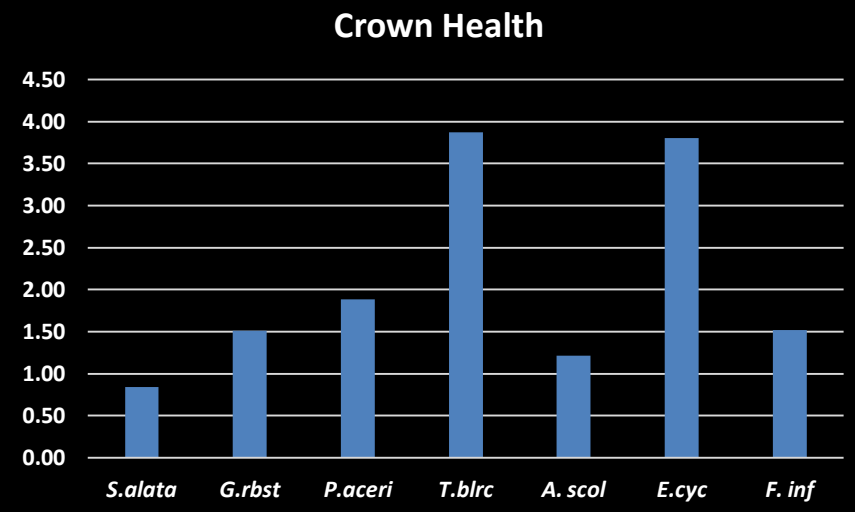
Average values of hazardous factor for each location category

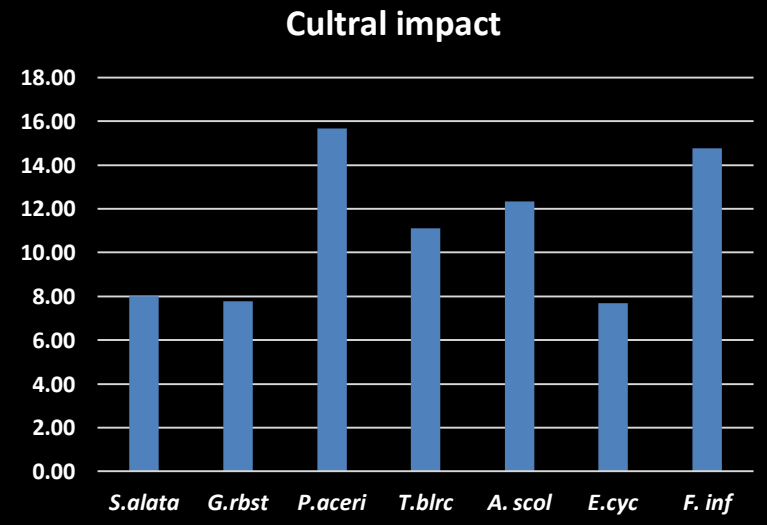
Species Name	Root Health	Stem Health	Crown Health	Cultural Impact
Sterculia alata	0.31	7.33	0.84	8.00
Grevillea robusta	1.11	11.39	1.51	7.78
Pterospermum acerifolium	3.08	4.83	1.88	15.67
Terminalia bellerica	2.64	1.84	3.88	11.11
Alstonia scholaris	0.39	11.46	1.21	12.33
Enterolobium cyclocarpum	0.54	10.38	3.81	7.68
Ficus infectoria	0.45	6.75	1.52	14.75

Comparative account of seven different species with respect to location category









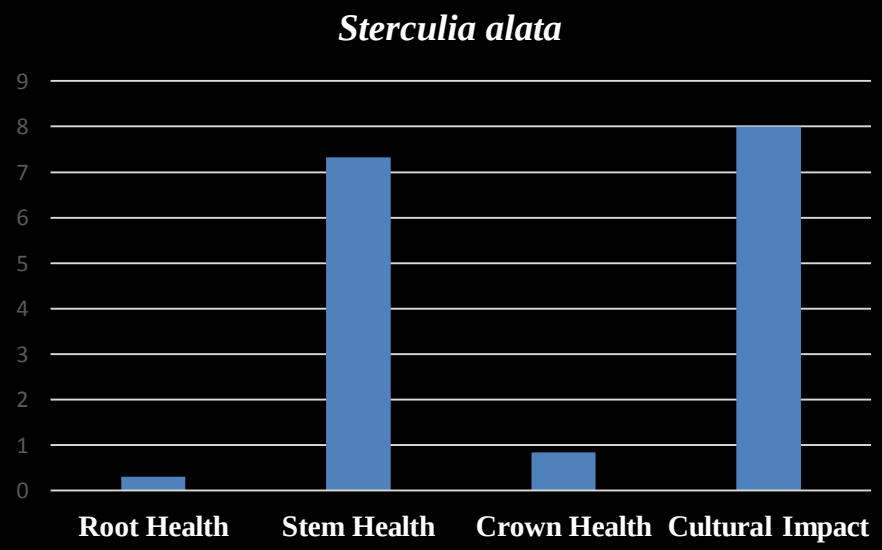
Species wise analysis of tree health

1. *Sterculia alata* : planted on V-6 Roads of sector-5

Total trees	Tree surveyed	Heart rot	Open wounds
54	54	18	23

Average hazard factor value for each location category in *Sterculia alata*

Root Health	Stem Health	Crown Health	Cultural Impact
0.31	7.33	0.84	8.00



Progressive Heart

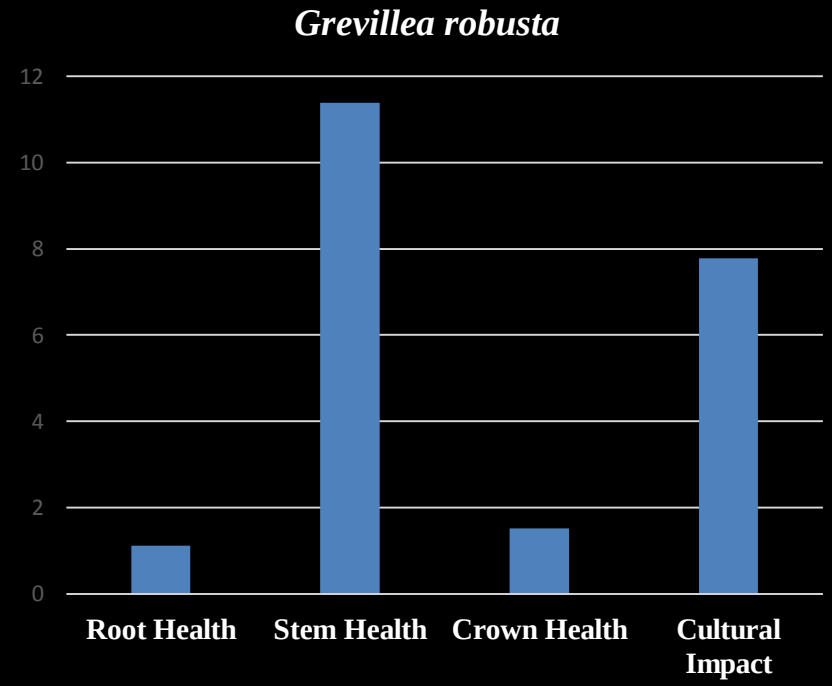
2. *Grevillea robusta* (Silver oak)

Locality	Total trees	Tree sampled	Heart rot	Open wounds & cankers
Sector 2A,10	196	57	27	50

Average hazard factor value for each location category in *Grevillea robusta*

Root Health	Stem Health	Crown Health	Cultural Impact
1.11	11.39	1.51	7.78

Tree failure due to canker girdling and heart



Root rot, heart rot and gall on a single tree

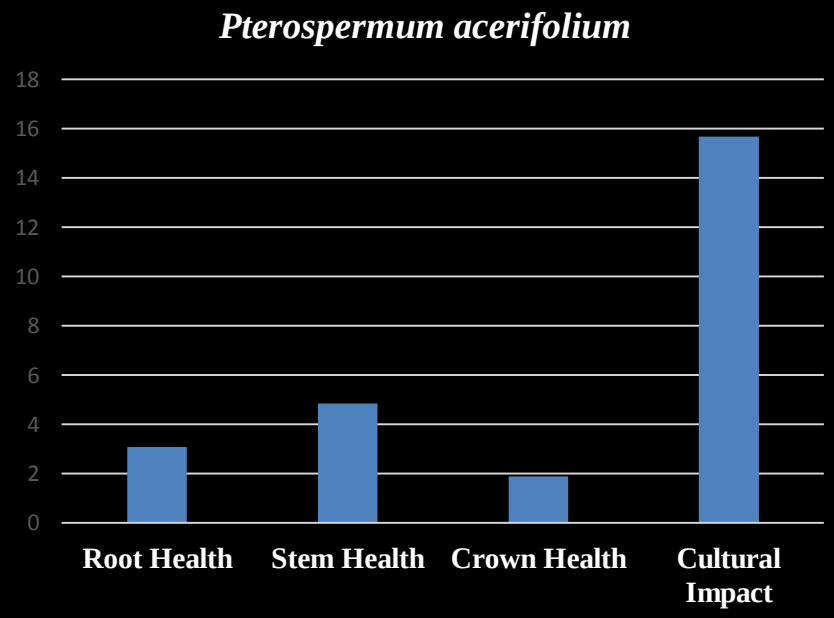
3. *Pterospermum acerifolium* (Kanak Champa)

Locality	Total trees	Tree sampled	Heart rot	Open wounds & cankers
Sector 37	159	20	1	4

Average hazard factor value for each location category in Kanak Champa

Root Health	Stem Health	Crown Health	Cultural Impact
3.08	4.83	1.88	15.67

Soil mounding and cementing in CRR



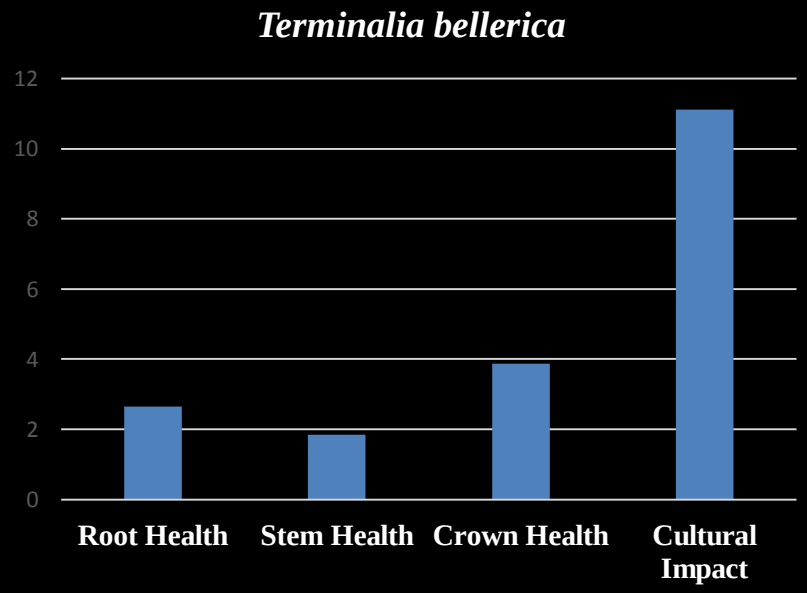
Ganoderma applanatum causin

4. *Terminalia bellerica* (Bahera)

Locality	Total trees	Tree sampled	Heart rot	Open wounds & cankers
Sector 34	136	15	1	1

Average hazard factor value for each location category in Bahera

Root Health	Stem Health	Crown Health	Cultural Impact
2.64	1.84	3.88	11.11



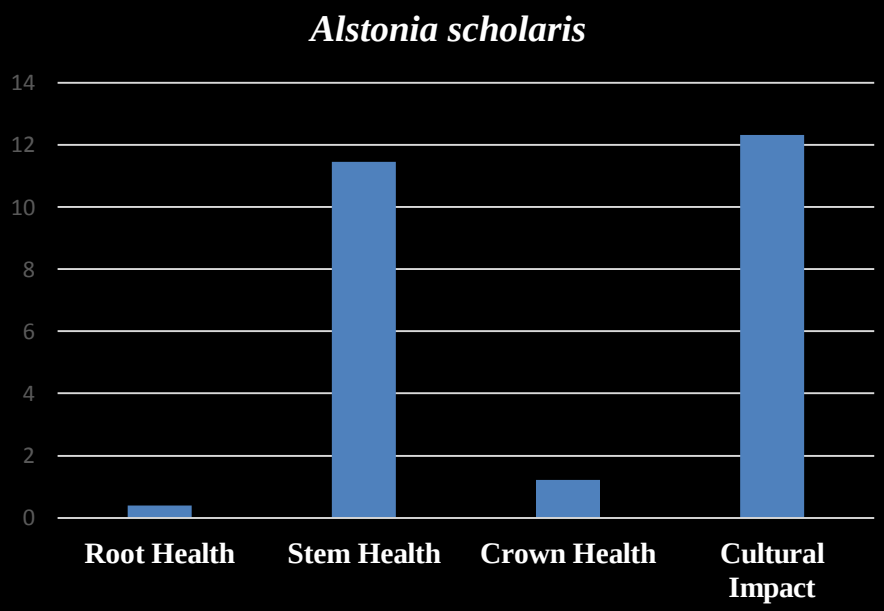
Tiling in CRR of tree

Alstonia scholaris (Saptparni)

Locality	Total trees	Tree sampled	Heart rot	Open wounds & cankers
Vidya path	325	40	10	37

Average hazard factor value for each location category in Saptparni

Root Health	Stem Health	Crown Health	Cultural Impact
0.39	11.46	1.21	12.33



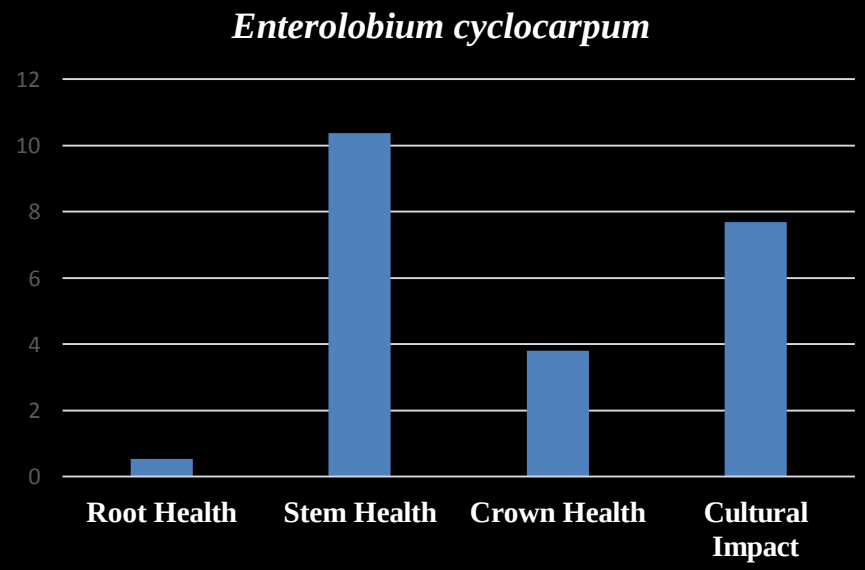
Enterolobium cyclocarpum (Earpod Tree)

Species name	Locality	Total trees	Tree sampled	Heart rot	Open wounds & cankers
Enterolobium cyclocarpum	Paschim Marg	65	33	11	29

Average hazard factor value for each location category in Earpod Tree

Root Health	Stem Health	Crown Health	Cultural Impact
0.54	10.38	3.81	7.68

Progressive butt rot and decaying for



Heart Rot in Fork

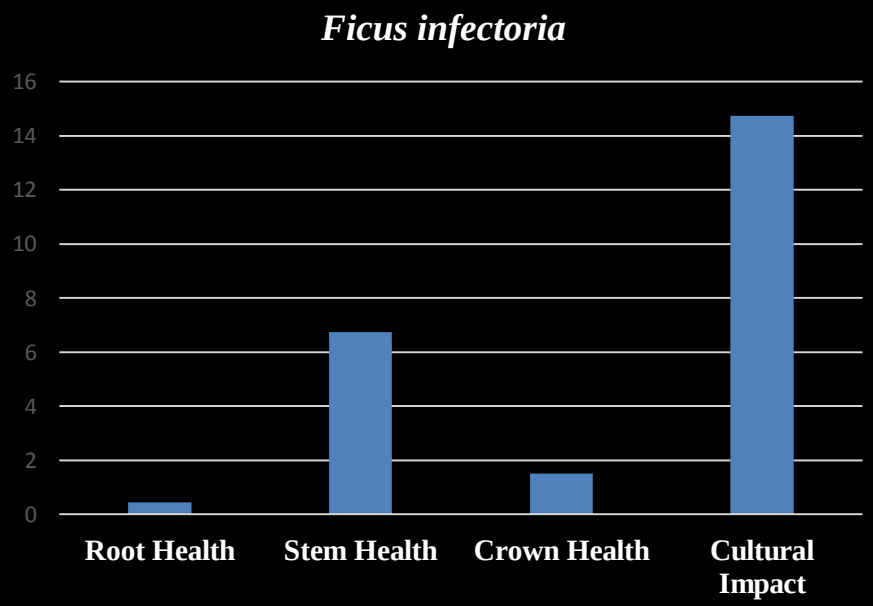
7. *Ficus infectoria* (Pilkhan)

Locality	Total trees	Tree sampled	Heart rot	Open wounds & cankers
Sarovar & Udyan Path	950	108	11	78

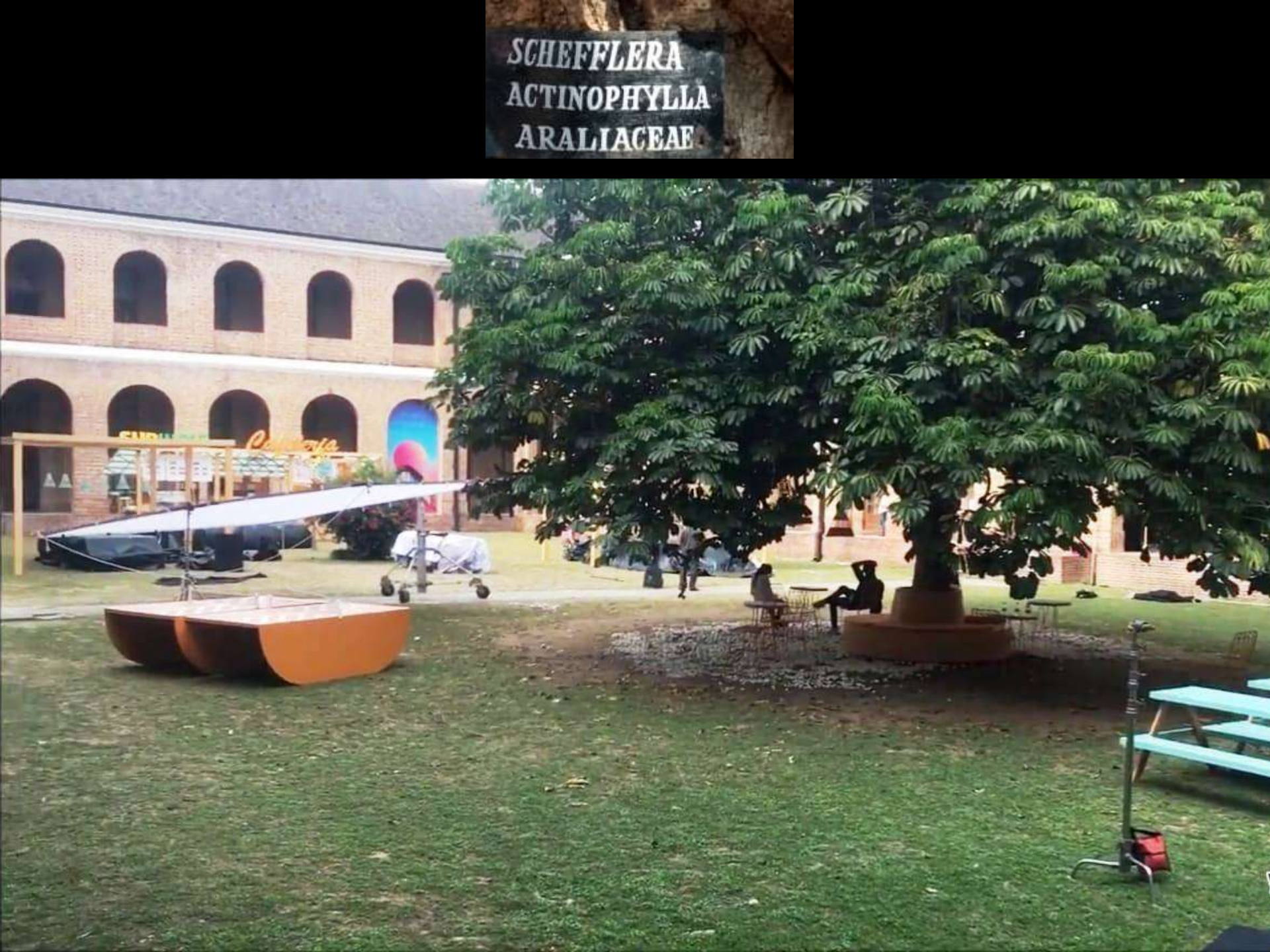
Average hazard factor value for each location category in Pilkhan

Root Health	Stem Health	Crown Health	Cultural Impact
0.45	6.75	1.52	14.75

Active digging in CRR



Restricted Root Space and Tiling in CR


SCHEFFLERA
ACTINOPHYLLA
ARALIACEAE