Protocols for Managing Tree invasion: Case studies in *Senna spectablis, Maesopsis eminii & Acacia mearnsii*

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Senna spectabilis (DC)H.S.Irwin and Barney

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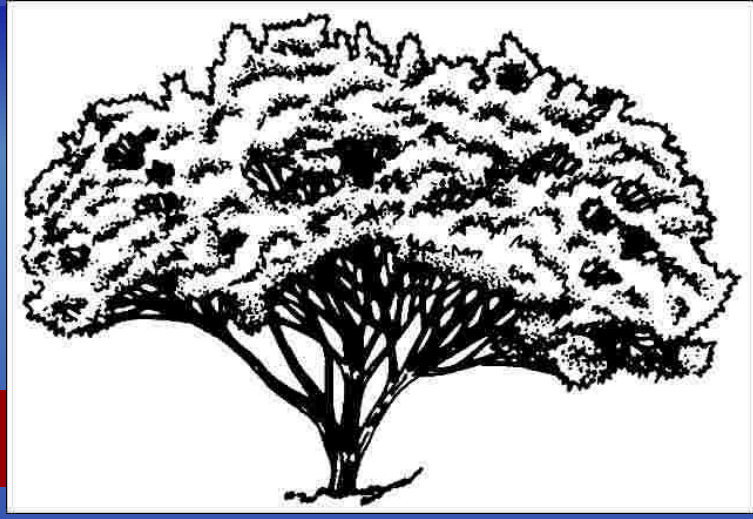
Scientific name : *Senna spectabilis*
Common name(s): Cassia/ Manjakonna
Family : *Leguminosae*
Native to : Tropical America



Description

Height	**:**10 to 20 meter
Spread	**:** 15 to 20 meter
Crown uniformity	**:** symmetrical
Crown shape	**:** round
Crown density	**:** dense
Growth rate	**:** fast
Texture	**:** fine

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Foliage

Leaf arrangement	: alternate
Leaf type	: odd-pinnately compound
Leaf shape	: oblong
Leaf type and persistence	: evergreen
Leaf blade length	: 2 to 4 inches
Leaf color	: green

Flower

Flower color	:yellow
Flower characteristics	: very showy

Fruit

Fruit shape	: pod, elongated
Fruit length	: 6 to 12 inches
Fruit color	: brown
Pest resistance	: resistant to pests/diseases

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- It has allellopathic effect and good coppicing ability
- It can invade disturbed forests, forest edges and gaps
- The spread of this *sp is* more dangerous than other exotic species owing to its quick growth

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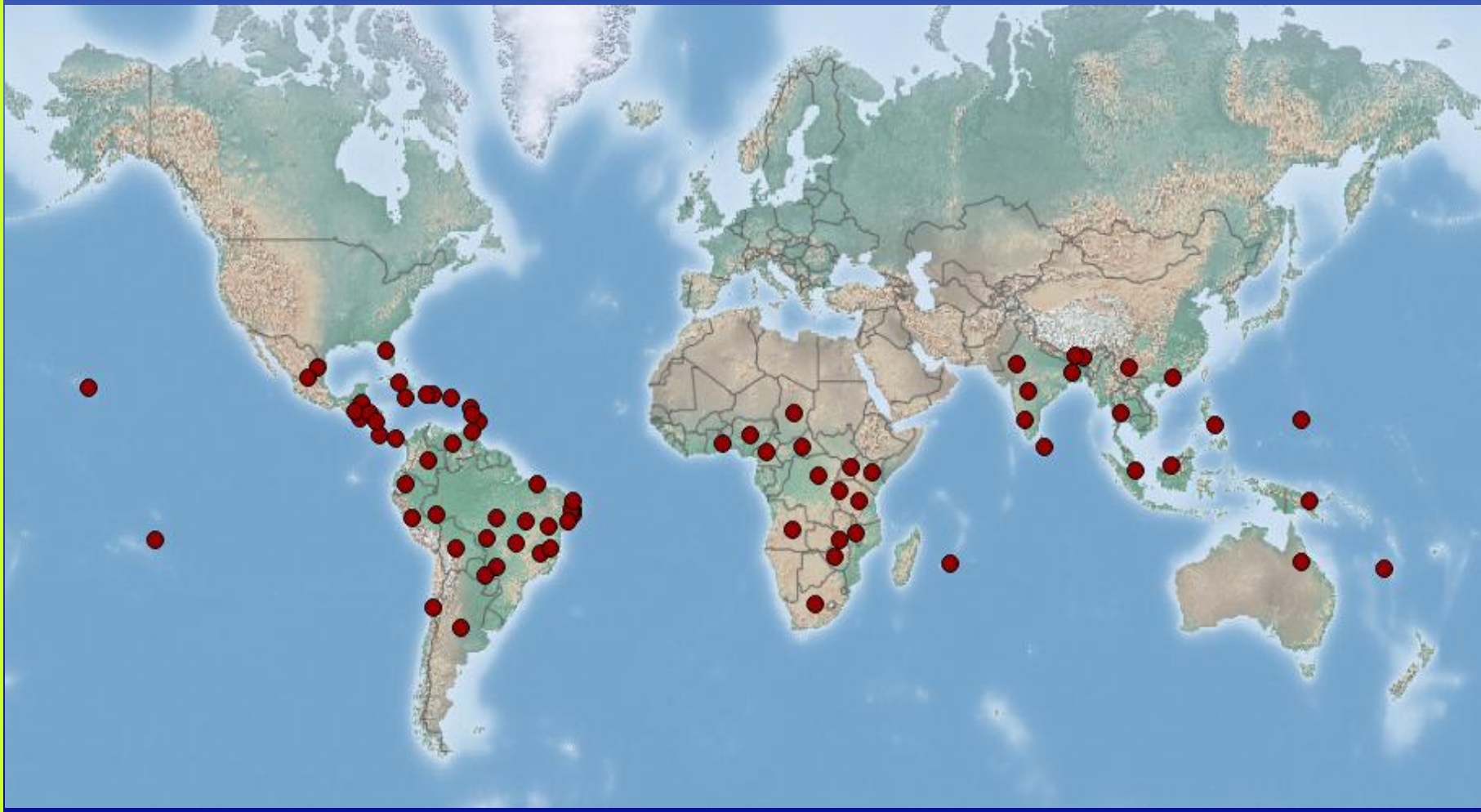

- It can withstand a wide range of environmental conditions
- It can establish easily and suppress the regeneration of native species

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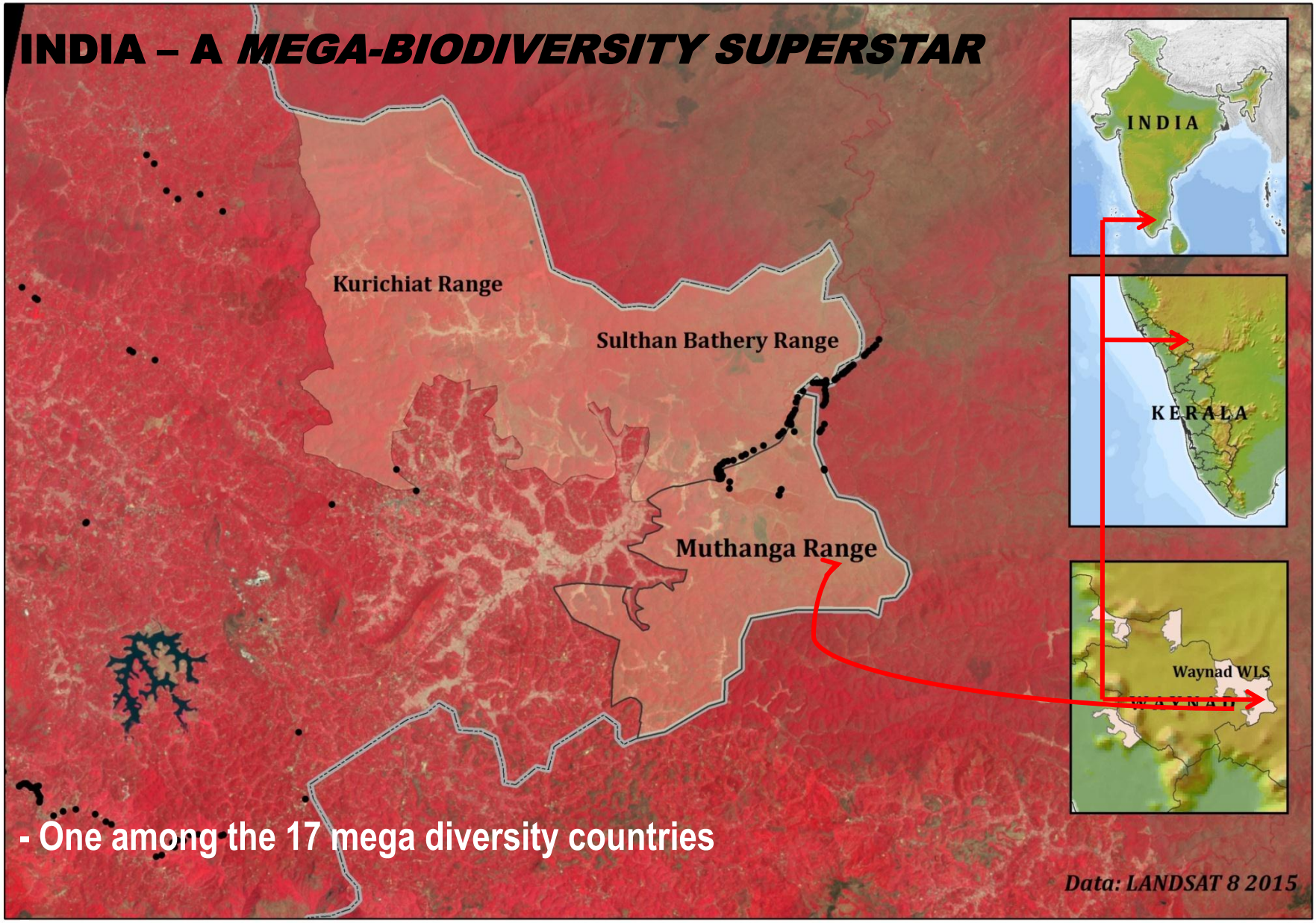
Wayanad Wildlife sanctuary



- Wayanad Wildlife sanctuary is contiguous to the protected areas of Nagarhole and Bandipur of Karnataka on the north-east and Mudumalai of Tamilnadu on the south –east.
- Wayanad Wildlife sanctuary is having an extent of 344.44 sq. km
- Rich in biodiversity and is an integral part of the Nilgiri Biosphere Reserve
- Altitude -2200ft msl

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The wild growth of *Senna spectabilis* is posing a threat to wildlife and indigenous plants in the forest areas of the Nilgiri Biosphere Reserve, a major habitat of Asiatic elephants in the country

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A survey conducted by KFRI shows that the plant is widely distributed in the Wayanad Wildlife Sanctuary.

This would worsen the man-animal conflict in the district. No part of the tree, except the endocarp of pods are edible to wildlife.

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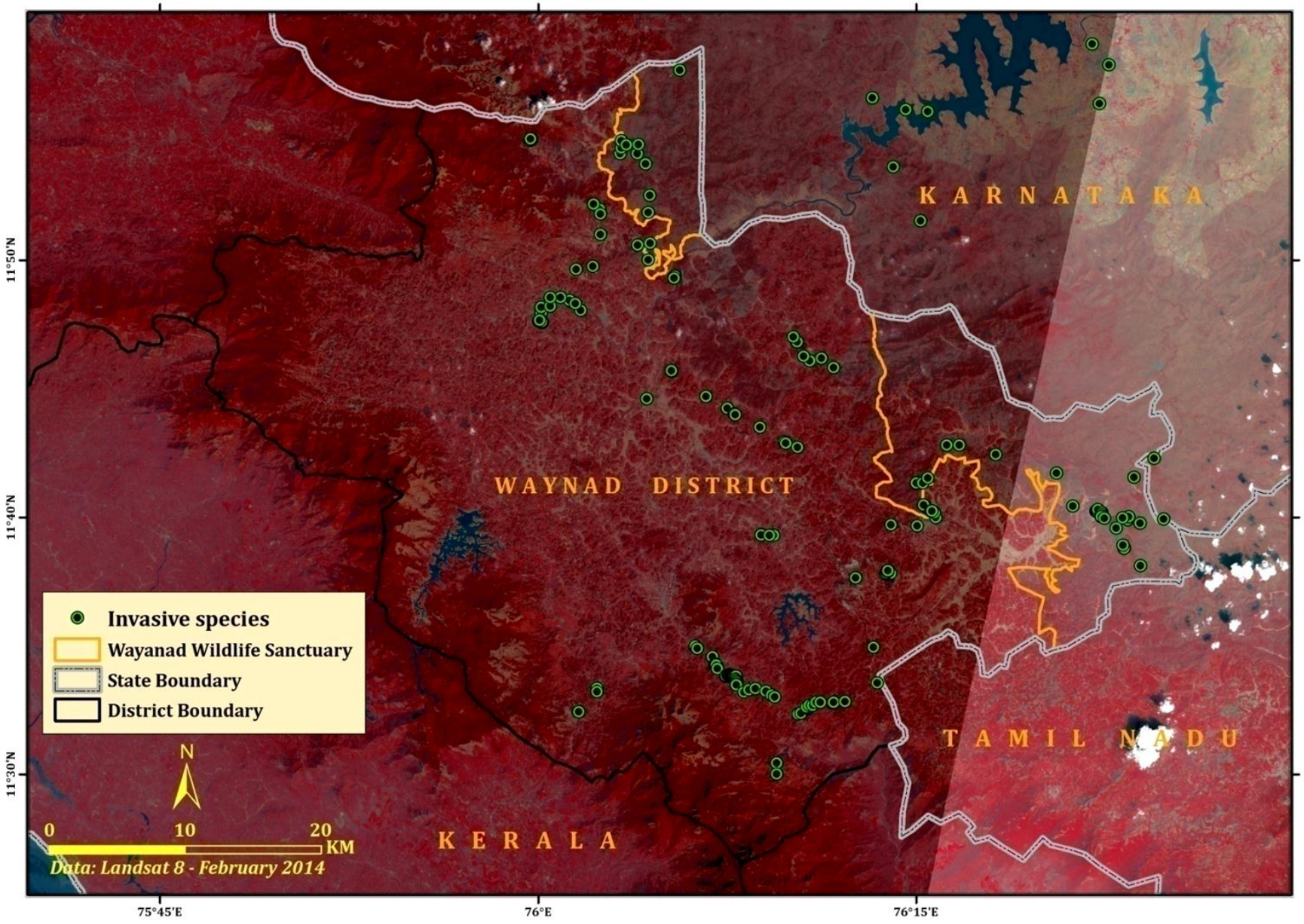
Survey for FIS- Wayanad wild Life Sanctuary



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Introduced as Avenue Tree

The spread of Senna in Wayanad region began with a social forestry programme of the Forest department in the Nineties

The recent mass flowering of bamboo has exasperated the situation by providing enough canopy opening.

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Growth pattern

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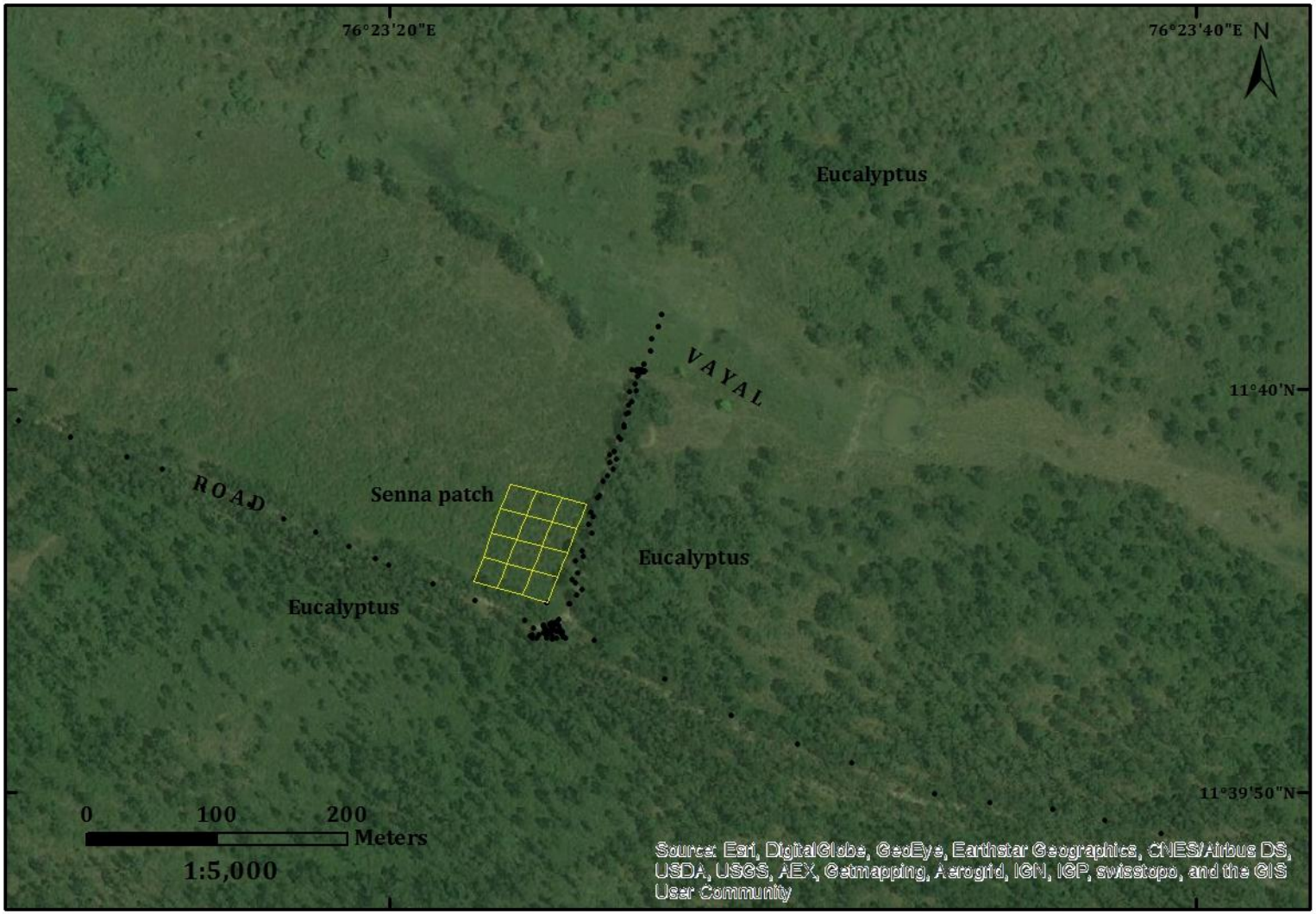
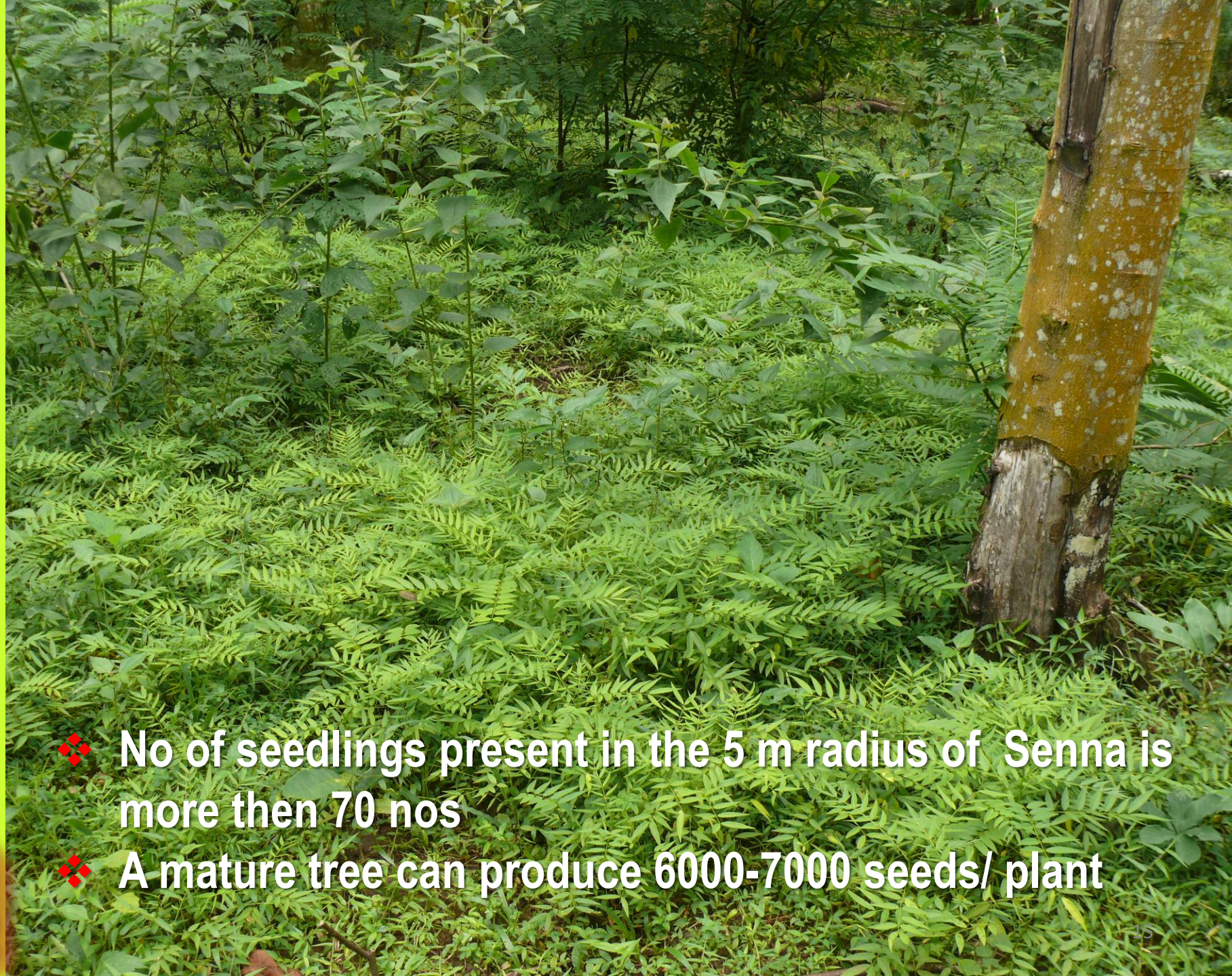
Study Area site





- No of seedlings present in the 5 m radius of Senna is more then 70 nos
- A mature tree can produce 6000-7000 seeds/ plant

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	Details of the Experiment on Control Measures
1	Cut-stump treatment : Removal by cutting at ground level in every 2 month interval
2	Cut-stump treatment and herbicide application : Removal by cutting at 1m and 0.5 m above the ground level and applying Glyphosate (45% v/v)at the cut surface (medium sized trees)
3	Ring-barking and herbicide application: Removal of bark 5 cm wide around the trees at 1 ft above ground level and application of Glyphosate (Large trees)
4	Removal by cutting at the collar region (Small trees)
5	Removing /pull out by excavator /JCB
6	Debarking: From collar region up to 1 meter trees
7	Cut the tree and bark striping
8	Cut from the base and cover with soil
9	Hand pulling: Removal by manual uprooting seedling below 6 month age

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Cut-stump treatment

Cutting at 1m & 0.5 m above the ground level and applying Glyphosate (45% v/v) at the cut surface in medium sized trees

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Result

Treated with Glyphosate

Without any treatment

Plant has dried while cutting at 0.5 m above the ground level and applying Glyphosate (45% v/v) at the cut surface in medium sized trees with in 30 seconds

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Result

Malformed epicormic shoots emerging in *Senna spectabilis*

Cutting at 1 m above the ground level and applying Glyphosate (45% v/v) at the cut surface in medium sized trees sows malformed shoots

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Ring-barking and herbicide application: Removal of bark 5 cm wide around the trees at 1 ft above ground level and application of Glyphosate (Large trees)

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Result

- Bark connectivity established
- Malformed shoots emerged

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Removal of small (1-3 m ht) *Senna spectabilis* trees by cutting at the collar region

Result

Profuse coppicing- up 21 sprouts

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Removing /pull out by excavator /JCB

Result

Profuse regeneration

Each root exposed to sunlight become new plant.

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Hand pulling: Removal of Senna by manual uprooting small seedlings

Result

No further regeneration

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Debarking: Debarking: From collar region up to 1 m above

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Result

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Debarking

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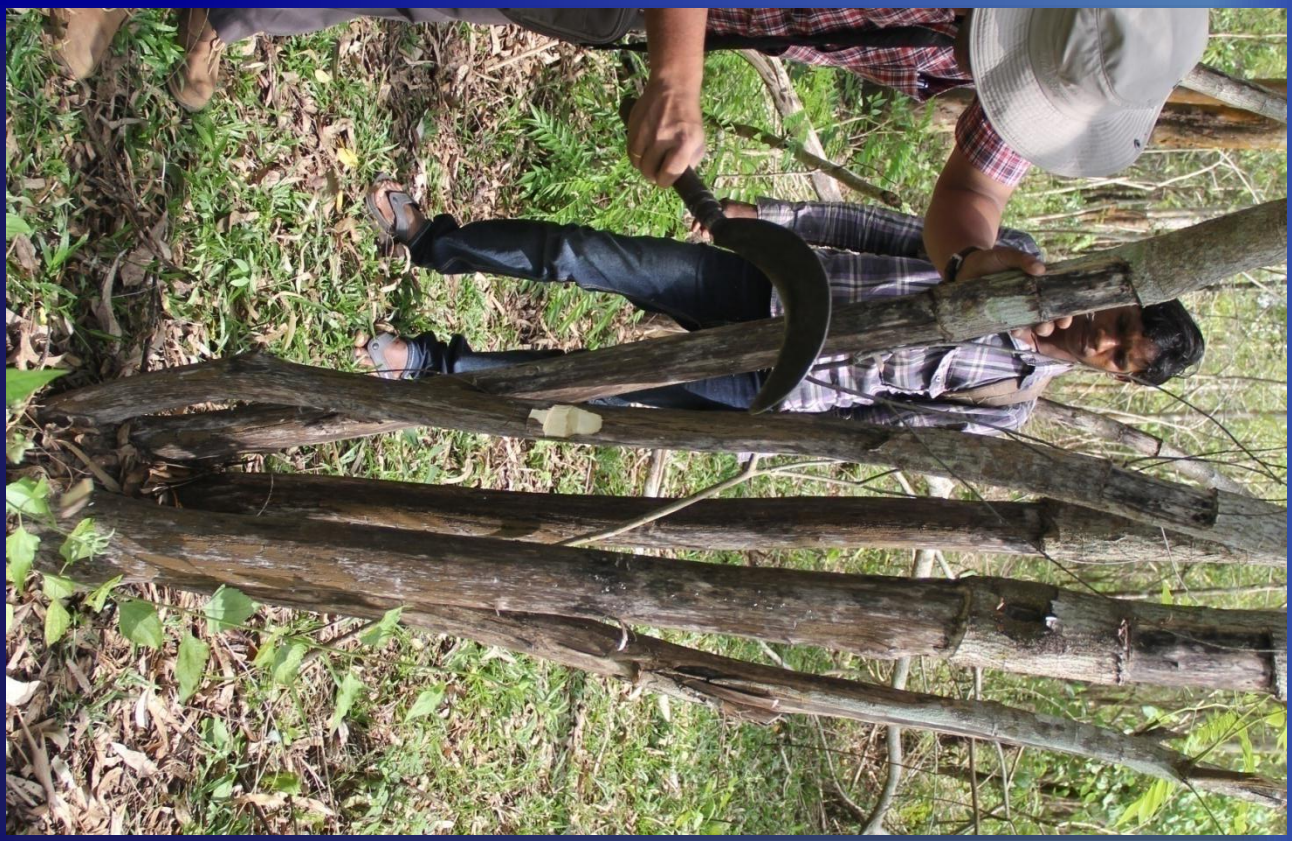

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- Bark connectivity established after 1 year and tree will be alive

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Viable seed setting reduced from 96% to 10 %
Seed germination reduced to 50-60%

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Cut the tree and bark striping

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Result

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Cut from the base, Treat with NaCl and CoC and cover with soil

Result

The tree treat with Nacl and COC were showing drying symptoms where as with out treatment were sprouted

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Management of *Senna spectabilis* : 3 tier management protocol

Seedlings: Manually pluck and remove

Medium sized trees: Cut at 0.5 m above the ground level and apply Glyphosate (45% v/v) at the cut surface with in 30 seconds (Efforts are being made to replace Glyphosate with Nacl and COC)

Cut the tree from 1 m above soil and peel of the bark

Large trees: Remove the bark from collar region up to1 m height.

Repopulate the area with native species

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Expenditure for weeding invasive species: Muthanga

Weed coverage: 90-100%
Working hours : 8 hrs/ day/worker
Wages INR 460/ day (Rs 460 /7hrs)

Lantana camara		*Chromolaena odorata*		*Senna spectabilis*	
Cutting	**Plucking**	**Cutting**	**Plucking**	**Debarking**	**Plucking seedlings**
No workers/ ha= 49.44	No workers/ ha= 49.44	No workers/ ha= 32.73	No workers/ ha= 49.4		No workers/ ha= 49.44
No hrs/ha= 395.52 hrs	No hrs/ha= 592.8 hrs	No hrs/ha= 261.82 hrs	No hrs/ha= 395.2 hrs		No hrs/ha= 395.52 hrs
Wages for 1ha= INR 22724.00 (USD 344)	Wages for 1ha= INR 34086.00 (USD 517)	Wages for 1ha= INR 13367.64 (USD 203)	Wages for 1ha= INR . 22724.00 (USD 344)	Wages for 1ha= INR Rs.92400/ tree (USD 1400)	Labour wages for 1ha= INR 22724.00 (USD 344)

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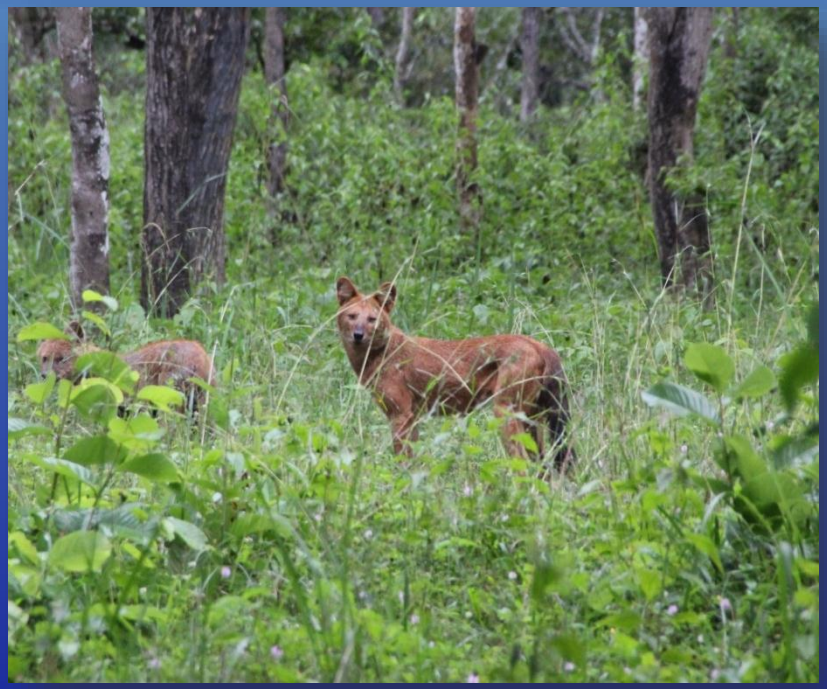

The wild growth of *Maesopsis eminii* is posing a threat to wildlife and indigenous plants in the forest areas of the Nilgiri Biosphere Reserve, a major habitat of many of the wild animals

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Scientific name : *Maesopsis eminii*
Common name(s) : Musizi, Umbrella tree
Family : Rhamnaceae
Native : Central Africa

Description

Height	**:**15 - 25meter
Spread	**:** 15 to 20 meter
Crown uniformity	**:** symmetrical
Crown shape	**:** round
Crown density	**:** dense
Growth rate	**:** fast
Texture	**:** fine

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Foliage

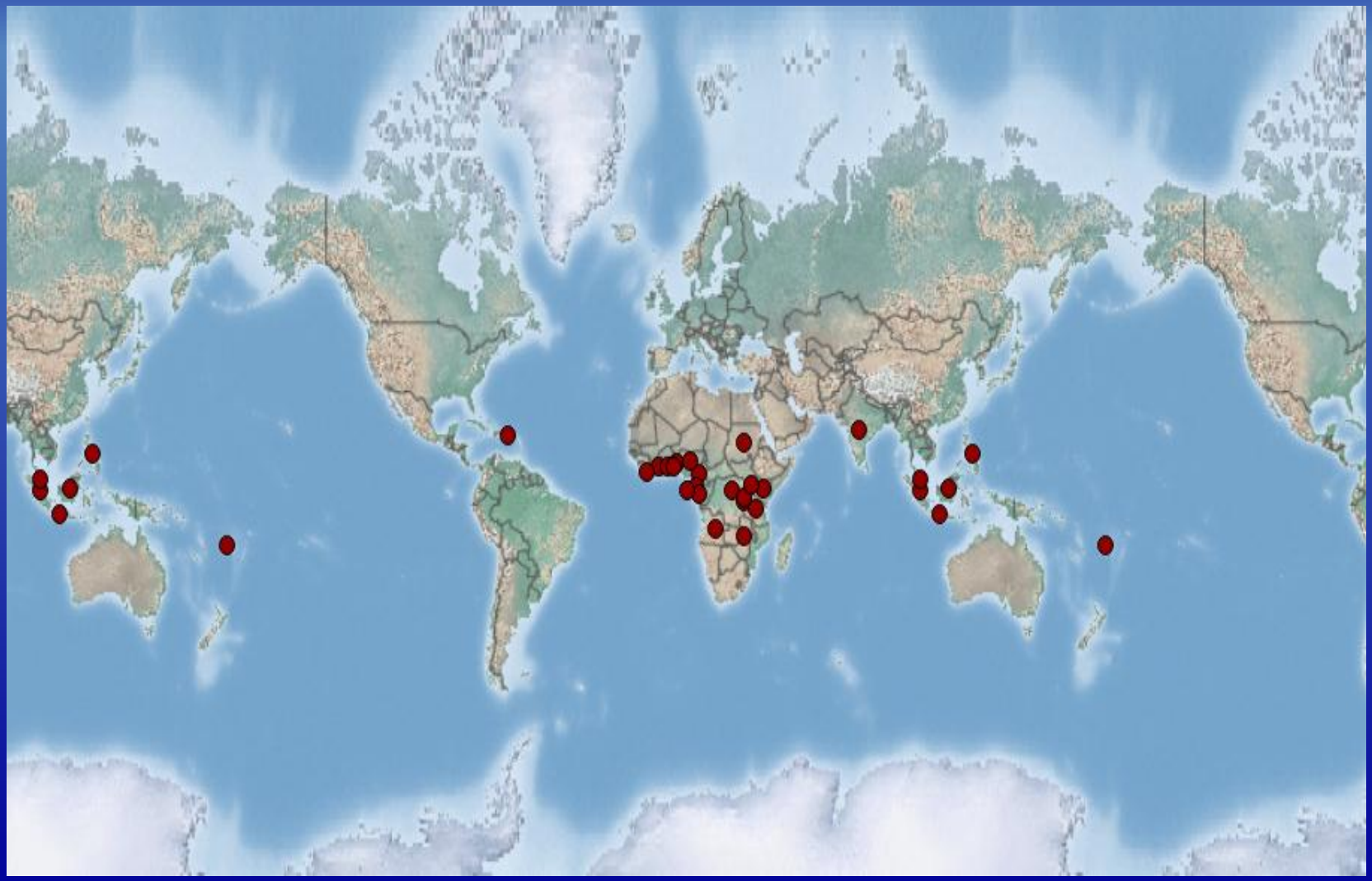
Leaf arrangement	: opposite sub - opposite
Leaf type	: simple
Leaf shape	: deccusate
Leaf type and persistence	: evergreen
Leaf blade length	: 7 to 14 cm
Leaf color	: green

Flower

Flower color	: yellowish green
Flower characteristics	: small flowers

Fruit

Fruit shape	: drupe,oblong
Fruit length	: up to 3 cm
Fruit color	: green to yellow wehen young and purple black at maturity
Pest resistance	: resistant to pests/diseases



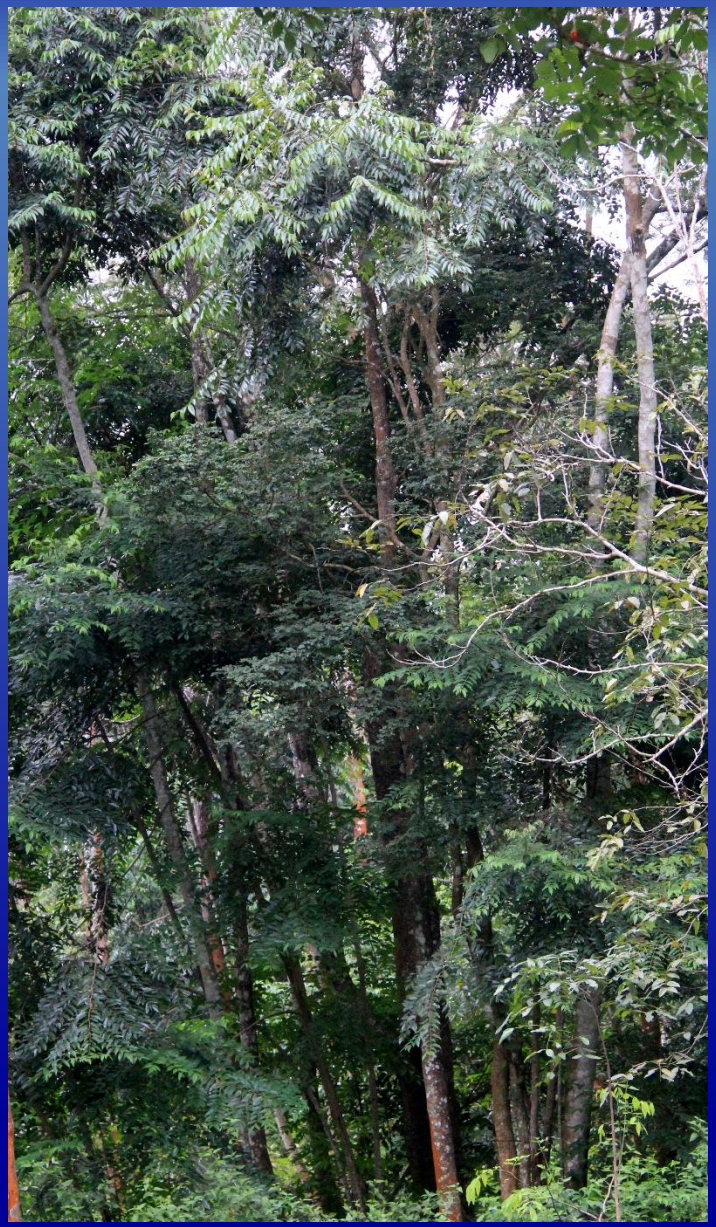
- It can withstand a wide range of environmental conditions
- It can establish easily and suppress the regeneration of native species

Introduced as shad tree in plantations

Maesopsis eminii

Seed germination percentage is very high
Invading the pristine vial ecosystem

	Details of the Experiment on Control Measures
1	Cut-stump treatment : Removal by cutting at ground level in every 2 month interval
2	Cut-stump treatment and herbicide application : Removal by cutting at 1m and 0.5 m above the ground level and applying Glyphosate (45% v/v)at the cut surface (medium sized trees)
3	Debarking: From collar region up to 1 meter trees
4	Cut from the base and cover with soil
5	Hand pulling: Removal by manual uprooting seedling below 6 month age



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Coppicing of *Maesopsis eminii*

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Management of *Maesopsis eminii* : management protocol

Seedlings: Manually pluck and remove

Medium sized trees: Cut at 0.5 -1m above the ground level for the plants having above 20 cm GBH

Cut at 0.5 m above the ground level and apply Glyphosate at the cut surface (Efforts are being made to replace Glyphosate with Nacl and COC) the plants having less then 20 cm GBH

Large trees: Remove the bark from collar region up to1 m height

Repopulate the area with native species

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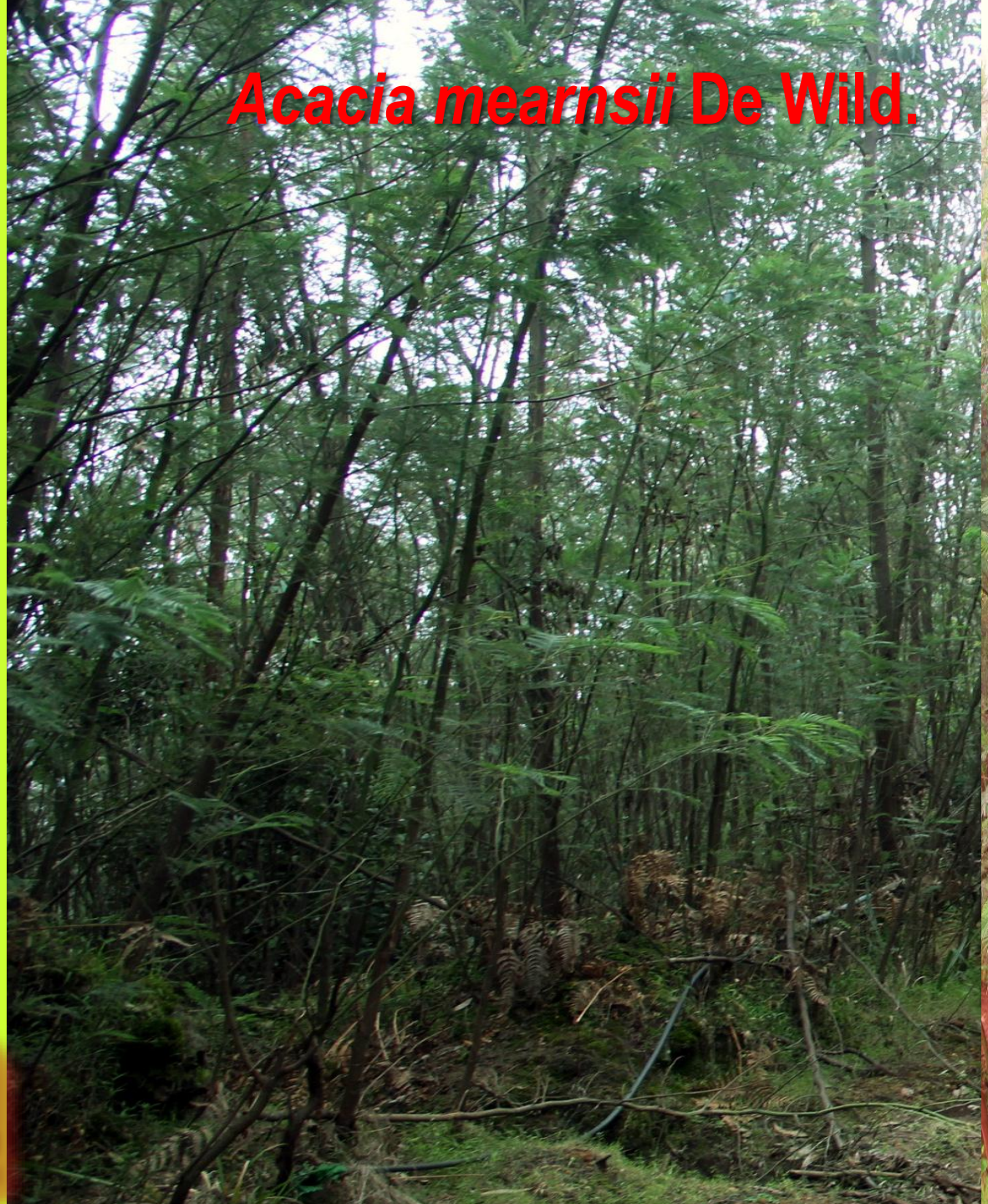
Acacia mearnsii De Wild.



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Scientific name : *Acacia mearnsii*
Common name(s): black wattle/tan wattle
Family : *Fabaceae*

Description

Height : upto 20m

Spread : 10 – 15 m

Crown uniformity : symmetrical

Crown shape : round

Crown density : medium

Growth rate : fast

Texture : medium

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Foliage

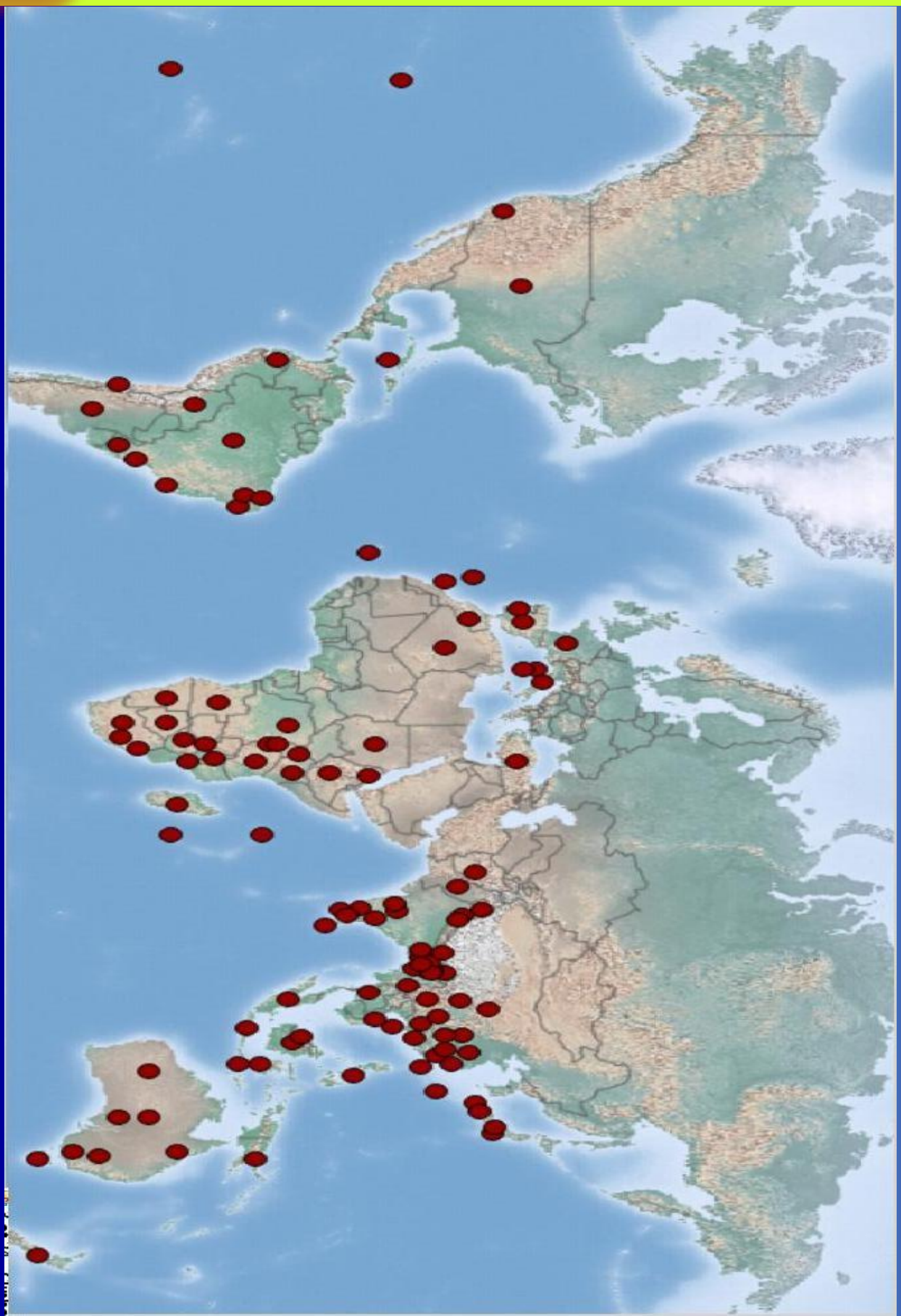
Leaf arrangement : alternate
Leaf type : bipinnately compound
Leaf shape : linear
Leaf type and persistence: evergreen
Leaf blade length : 10 - 12
Leaf color : green
Native : South and East Australia

Flower

Flower color : yellowish or white
Flower characteristics : very showy

Fruit

Fruit shape : pod, elongated
Fruit length : 1 – 14 cm
Fruit color : brown
Pest resistance : resistant to pests/diseases



- It is recorded as invasive in especially shola forests of Kerala India
- It has allellopathic effect and coppicing ability
- It can invade disturbed forests, forest edges and gaps
- It can establish easily and suppress the regeneration of native species

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Forest Fire

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Field Experiments

SL NO	Experiments
1	Debarking
2	Ring barking
3	Cut at 50 cm above the ground
4	Drill fill
5	Uprooting seedlings

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Drill fill:

Holes are drilled into the lower part of the trunk, The holes are drilled with an angle of 45 degree to avoid spillage of the herbicide applied. The holes should not be too deep (limit to 5-7 cm) and should remain in the sapwood area. If there are multi-stems, each stem should be treated.

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Result

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Uprooting seedlings

Result

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Cut at 50 cm above the ground : GBH more then 15cm

Result

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Debarking : Mature tree

Result

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Repopulate the area with native species

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Management of *Maesopsis eminii* : management protocol

Seedlings: Manually pluck and remove

Medium sized trees: Drill fill using Glyphosate (45% v/v) at the cut surface (Efforts are being made to replace Glyphosate with Nacl and COC)

Large trees: Cut from the basal portion / fell the tree.

Repopulate the area with native species

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Management and conclusion

The precise management measures adopted for any plant invasion will depend upon factors such as the terrain, availability of labour, severity of the infestation, presence of other invasive species and the cost involved.

The best form of invasive species management is prevention.

If prevention is no longer possible, it is best to treat the weed infestations when they are small to prevent them from establishing (early detection and rapid response).

Controlling the weed before it seeds will reduce future problems.

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THE HIND
SUNDAY, OCTOBER 15, 20

nvasion

nges in hydrology and ecosystem

Threat to wildlife sanctuaries too

A worker debarking a *Senna spectabilis* plant at the Wayanad Wildlife Sanctuary.

E.M. MANOJ
KALPETTA

The absence of a comprehensive strategy to arrest the wild growth of invasive alien plants in the forest areas of the Nilgiri Biosphere Reserve, including the Wayanad Wildlife Sanctuary (WWS), poses a threat to wildlife habitat.

Apart from the spread of Manjakkonna (*Senna spect-*

Tholpetty range of forests under the sanctuary. Taking clues from the studies conducted in various parts of the world and based on the recommendations from research institutions like Kerala Forest Research Institute (KFRI), the sanctuary management has been trying out several control measures to eradicate the plant, but without

KFRI steps in to fight biological invasions

Nodal centre to tackle alien species

E. M. MANOJ
KALPETTA

The Kerala Forest Research Institute (KFRI) is gearing up to set up a Nodal Centre of Alien Invasive Species Research and Management to fight biological invasions in the State.

"The nodal centre, the first of its kind in the country, under the KFRI envisages to provide a single window for addressing biological invasions," S. Pradeep Kumar, director in charge , KFRI, told *The Hindu*, which published an article on the gravity of the threat on Sunday.

₹3 crore plan

"We are planning to set up the centre at a cost of ₹3 crore and it would be set up in three months," Dr. Pradeep Kumar, who is also the member secretary, Kerala

tablished invasive species," said T.V. Sajeev, Scientist, KFRI. "It would also keep track of the movements of invasive species across countries in the Asia-Pacific region," Dr. Sajeev said.

The KFRI has successfully completed an international project supported by the Food and Agricultural Organization (FAO) on alien invasive species of India and the Maldives. It has already prepared a checklist of alien invasive plants in Kerala and is also active in research on the invasive giant African Snail. "The centre would coordinate activities such as developing management protocols for the eradication of invasive flora and fauna; habitat restoration programmes after removing the existing invasive species in the forest areas of the State, including Wayanad; and early detection of the new species and rapid response against its spread," T. K

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Projection Team

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