"The best time to plant a tree was 20 years ago.

The next best time is now."

Mara Belesi, Mara Ulisi

(Plant a Tree, Save a Tree)

One tree can make a difference

Strategic Tree Plantation Project for Bangalore

CONTENTS

STATE GOVERNMENT initiative

2406-01-102-2-18

Road side Plantation - APCCF Development

Since the year 2000, lot of trees have been cut for the purpose of widening of Roads. Hence, there is an urgent need to take up roadside plantations in all the Districts of Karnataka. For this purpose, a new scheme of Raising Roadside plantation is implemented by Karnataka Forest Department. Under Roadside plantation programme, apart from regular Roadside planting works, SCP and TSP component works were also undertaken. Under this, seedlings will be planted along the roads adjoining the SC/ST colonies. Similarly, under TSP component seedlings will be planted along the roads adjoining the Tribal colonies.

http://aranya.gov.in/Static%20Pages/SchemesPlanned.aspx

2406-01-101-2-10

Greening of Urban Areas - APCCF Development

Under this scheme, it is envisaged to plant flowering and fruit bearing trees in urban areas. Tree parks and avenue plantations will be established in the towns and cities of the State. Seedlings will also be supplied to the residents of urban areas.

- APCCF

(**Additional Principal Chief Conservator of Forests)**
(Development)

Refer site for central scheme

http://nrega.nic.in/netnrega/writereaddata/Circulars/A_plan_action_roadside_tree_plantation.pdf

GENERAL INFORMATION

	Title of the Proposal	**Mara Belesi, Mara Ulisi.** *Strategic Tree Plantation Project*
1.	Project location	Bangalore
2.	The Applicant	Janadhare Trust®, Bangalore
3.	Contact Details of the Applicant	Cyril Prabhu J ***Secretary*** Green India Daisy Apts 004, 1st cross, (near Rajkumar park) Kammanahalli, Bangalore Mob No. +91 9902760859 Email: prabhu2424@gmail.com
4.	Number and Year of Registration	BNS-4-00449-2012-13
5.	Bank Account Details	**Name of the Account:** Current account **Name of the Bank:** Bank of India **Account Number:** 843702011000311 **IFSC:** BKID0008437
6.	Income Tax Exemption No.	DIT(E) BLR/12A/G-394/AABTJ7020L/iTO(E) - 1/VOL 2013-14
7.	PAN No.	AABTJ7020L
8.	Project goals	Planting 10000 samplings
9.	Estimated budget	**Rs. 48,30,510/-**
10.	Expected Outcome	Bring back the lost beauty of Bangalore city
11.	Project Period	18 months

INTRODUCTION

Trees and human life, the trees around us are extremely important and have always been necessary for improving the human conditions and their very existence, it is not too hard to believe that without trees we human would not exist on this beautiful planet. The modern human community has other, more practical reasons to admire and honour trees. Here short lists of reasons trees are necessary for improving our worldly conditions, trees are an important part of every community. Our streets, parks, playgrounds and educational institutions are lined with trees that create a peaceful, aesthetically pleasing environment. Trees increase our quality of life by bringing natural elements and wildlife habitats into urban settings. We gather under the cool shade they provide during outdoor activities with family and friends.

Trees help us breathe and provide a home for quite a few kinds of birds, animals and insects. They are the largest and longest living organisms on earth. To grow tall, the tree has become a miracle of engineering and a complex chemical factory. By photosynthesis, the leaves combine the water and salts with carbon dioxide from the air to produce the nutrients, which feed the tree. In this process, as well as wood, trees create many chemicals, seeds and fruit of great utility to man. In addition, trees provide refreshing shade.

Trees are the lungs of the environment. They have an indisputable role in bringing rain to earth. They provide a cover over the top surface of earth preventing excessive heating up by solar rays. Trees provide the human species with constant supply of oxygen. This oxygen, which humans in turn use for survival, is produced through trees as they intake various amounts of carbon dioxide, which humans exhale. Therefore, from these we can understand that loss of tree means, loss of human life.

Due to the advent of urbanisation, cities started booming, people started stagnating at particular place in order to supplement their needs, and there was rapid unplanned infrastructure development, which led to greater larger scale of deforestation. In addition, in the name of development of Information technology, huge industries, factories and other commercial companies was established. Now major problems faced by the urban life are air pollution and poor quality of environment and various other health related issues due to loss of tree cover.

If these problems are not addressed now, we are going to face terrible consequence in near future; already we have started facing the problems like unpredictable weather conditions, poor quality of air and various health issues. To bring the lost riches of the city, integrating trees into our city creating a healthy living, against all odds, it will be accomplished by Janadhare (JD Team), a non - profit organisation actively involved in social activities and very closely work with youth volunteers, this time JD team has designed an exclusive environment developmental project, bring a green makeover for our namma Bengaluru.

JANADHARE TRUST ®

A group of "likeminded" people have dedicated their time and energy for being a change agent in the society. Janadhare literally means "flow of people "but our goal and vision to set this name for our team is "working with the people for the people".

We derive our inspiration from NSS, because all the members who have been actively involved in our group were NSS volunteers from various colleges across the Bangalore city. But currently we have students and working professional from various fields such as engineers, lawyers, bank employees, businessman's and many more not to forget very active student volunteers who are the greatest support for our event.

We began our social activities during the year of 2010, applying the the principles and values learnt from the NSS, we undertake activities such as food distribution, distribution of clothes to the needy, conducting sports events for kids, orphanage, old age homes visits. However, as the days passed we realised that we had to take a stand and set our goals clear to work even better for the development of society. Therefore, officially registered in the year 2013 as a civil society organisation.

One of the major objectives our team is "sensitization" or "creating awareness", because we believe precaution is better option than treatment. Keeping this objective in mind, our works completely evolve around this core objective.

Thrust area of work

- *Women and child development & protection of rights*
- *Microfinance for self help groups*
- *Health care support for women, children and Senior citizen*
- *Support for differently abled*
- *Leadership trainings for Youth (Boys & Girls)*
- ***Environmental issues, Protection and preservation***
- *Good Governance and Advocacy*

RATIONALE OF THE PROJECT

Bangalore

Bangalore, a metropolitan city in South India, has gained its "Garden city" image since the time it was a princely state under Tippu Sultan in 1782. Tippu established a vast expanse of garden; the city has now fast-tracked to the image of "*IT city of India*" with a disproportionate economic growth rate due to the advent of Information Technology companies. It now faces a dilemma between conserving its green spaces and expanding infrastructure to meet this growth. Due to advent of IT boom in the city, it has both positive and negative effects on the city, enormous amount of changes in Bangalore infrastructure, increasing population in the city along with that increasing consumption limited resources which has led to decreasing greener space in our city and it unpredictable climate in the city. Urbanisation at a rapid pace is a reality at present, thus enhancing the environmental qualities of urban forestry is an important contributory factor, control of air and noise pollution, micro climatic modification and recreational purpose of the urban population, a strategic plan for greening in the city especially with respect to land availability in the form of park and gardens, forest patches and road side plantations. Therefore taking up developmental works is the need.

Street trees are frequently blamed for causing damage to infrastructure including road and footpath surface, particularly due to the large quantity of narrow streets and the lack of adequate space, trees shed limbs from time to time, which can be potential threat to personal safety and property. Tripping on footpath due to lifting from tree roots and accidents involving collisions with trees planted to the roadside and other potential safety issues.

Leaf litter requires ongoing maintenance including street sweeping and cleaning house drains and gutter these kinds of the major blames on the trees within the city limits. These factors to be considered to build a strategic plan for plantation. The project not only aims at planting trees and creating an improved quality for living, also have regular check over the grow of the tree, even maintain the growth of tree, give an equal and aesthetic look for all the trees at one particular streets across Bangalore city.

TREE AND ITS BENEFITS FOR URBAN RESIDENCE

A tree is a woody plant, a perennial that does not die even after its reproduction cycle; it grows to at between 7ft to 20ft, with an erect main stem (trunk) at least three inches in diameter ("breast height," or 4 1/2 feet), it bears leaves on a crown or mass of braches and tends towards a characteristic or shape.

- ✓ Trees are important, valuable and necessary to our existence as they furnish us with life's essentials, food, oxygen, shelter and other medicinal values. Apart from these, they add to the beauty of life.
- ✓ Trees control noise pollution, they are good noise buffers, trees planted at strategic points in a neighbourhood or around your surroundings, can abate noises from freeways and airports
- ✓ Trees also help to control pollution, they improve the quality of air and they are the nature's air conditioners, they purity the air absorbing carbon monoxide, sulphur dioxide and nitrogen. A mature leafy tree produces as much oxygen in a season 10 people inhale in a year. In one year, the average tree inhales 26 pounds of carbon dioxide, the amount emitted by a car on an 11,000-mile trip. They are the greatest collectors of sun energy and provide shade. They control soil erosion.
- ✓ Reduced Temperatures, Trees have been shown to significantly reduce the urban heat island effect and produce citywide changes in temperature since they cool the air through evapotranspiration. Trees have been found to have the greatest potential for cooling in urban areas compared to other climate change adaptation measures
- ✓ Connection to nature and the human senses. Urban street trees provide a canopy, root structure and setting for important insect and bacterial life below the surface; a shade for people, animals, etc; they act as essential lofty environments for songbirds, seeds, nuts, squirrels and other urban

life. Indeed, street trees so well establish natural and comfortable urban life.

- ✓ Urban parks play a vital role in human life, in aspect of physical and mental wellbeing.
- ✓ Educational institutions, learning value

OBJECTIVES OF THE PROJECT

Three Important aspects of the Project

- ★ Right tree at right place – tree plantation at either sides of the roads- Selection of potential areas, streets or green space for new trees
- ★ Rejuvenating greener space – parks and educational institutions
- ★ Community involvement

Objectives

- Healthy vegetation which is appropriate for the area.
- To improve the quality of air and environment.
- Convert streets, parking and foot paths into more aesthetically pleasing environments.
- Planting trees on either side of the roads to produce greener landscape, which is one tree required for every 25ft or some time flexible requirement: based on the location and site survey report the tree spacing would be considered.
- To reduce the noise pollution caused by motor vehicles
- To control soil erosion
- To provide shade for the road users as well as the pedestrians, creating a pleasant experience for travellers.
- To enhance the quality of the park, particularly the way in which it would benefit the younger people.
- Involvement of stakeholders and networking with likeminded groups.

PROJECT TIMELINE:

Phase	Season (*timeline for work*) 2015-2016	Implementation Process
First Phase **Site survey* **Selecting potential areas, streets or green space for new trees* **Selection of trees and shrubs species*	Jun, Jul, Aug	1. Identification 2. Mapping the requirements 3. Selection of trees and shrubs species 4. Training the staff 5. Strategic planting methodologies 6. Staff training and Other supportive programs
Second Phase *Right Tree at Right Place*	Sep, Oct, Nov, Dec, Jan, Feb	1. Site Preparation 2. Tree plantation at either side of the road 3. Residential areas 4. rejuvenating parks 5. Educational institutions
Third Phase *Tree care & maintenance, tracking the progress and reporting*	Mar, Apr, May, June, July	1. Analysing the positive and negative factors 2. Reporting any related issues for corrective action
Fourth Phase *Evaluation of growth*	Aug, Sep, Oct, Nov	1. First round of follow ups

PROJECT DESCRIPTION

★ **First Phase**

(June, July, August):

Identification of areas to be planted, prepping for planting.

Objectives:

a) Mapping the current status of greener in Bangalore city
b) Database of existing trees
c) To find the means and ways the latest trends practiced in the Bangalore to save the urban green space
d) Assessment of trees planted in residential areas, private companies and other institutions
e) Assessments on functional parks and its benefits to that locality
f) Assessments of roadside tree plantation.
g) To find out the preferences of tree species in different areas in Bangalore city
h) To develop a strategic plan for plantation
i) Environmental education for students, campaigns and other awareness related events
j) Training for staff for the project execution

Factor for field survey

- Community involvement

Stakeholder meetings at all identified sites, involvement of that particular locality resident. To welcome suggestion from them and planting a map.

Involving local youth or other volunteers for recording site-specific information, because it is all about their locality and local knowledge.

- Choosing trees

Evaluating the city's needs, assisting environmental conditions (climate, present conditions of soil, availability of water) and variables as that will be a greater importance to assist decision makers. Collecting in-depth details from beneficiaries who are depended on the trees for their living, energy saving and other retails aspects. An environmental aspect such has, which cuts the solar radiation and keeps the surrounding cooler even improves the quality of air.

- Locating Parks

Identification of parks located at residential areas and collecting details on lost park or ill maintained park. Based on the local residence interest and expectation creating a design and structural maintenance to improve the quality of park.

- Educational institutions

Identifying likeminded institutions, who share similar objectives of project and work hand in hand. Moreover, conduct training session or other supportive events, which upholds the importance of tree plantation.

★ Second phase

(September, October, November):

- ✓ Planting of trees in peak rainy season, development and installation of labels
- ✓ Planting and establishment
- ✓ Based on survey report the planning would to done accordingly, a basic tree plantation guide refer *annexure II*

Break up of sampling plantation

Proposed plantation	**Shrubs/ Medicinal Plants**	**Trees**
Streets	500	4500
Parks	400/1000	1000
Educational and other institutions	600/400	1600

* Data might vary after the survey report

** Medicinal plants for improving health conditions only

*** Sapling Meaning Nursery Plants

Site plantation

Bruhat Bangalore mahanagara palike administering body of Bangalore city, according to BBMP Bangalore is constituted into 8 Zones and 198 wards.

PROPOSED PLANTATION SITE

	Zone	**Wards**	**Major area**	**Plantation**		
				school	Residential area/ Street wise	Parks*
1	West	44	Yeshwanthapur Sanjaynagar Malleshwaram Mahalakshmipura Gayathrinagar Rajajinnagar Sriramamandira Gandhinagar Chickpet Chamarajpet	4		24
2	South	44	Binneypet Govindaraj Nagar Chandra Layout Jagajeevan Ramnagar Basavanagudi Hanumanth Nagar Padmanabha Nagar Jayanagar Homegowda Nagar Madiwala	5		57
3	East	44	Koramangala Shanthinagar Jeevanbheema nagar Bharathinagar Sarvagnanagar Banaswadi Shivajinagar Jayamahal Hebbal Kadugondana halli	8		62
4	Mahadevapura	17	Hudi Ramamurthy Nagar KR Pura Marathahalli Varthuru Kadugodi A Narayana pura	3		25
5	Rajarajeshwari	14	Kengeri Hemmigepura Laggere Dodda Bidarakallu	5		107
6	Dasarahalli	8	Mallasandra			20

			Bagalakunte T Dasarahalli Chokkasandra Peenya Hegganahalli Rajagopalnagar			
7	yelahanka/byataraya na pura	11	Kodigehalli Byatarayanapura Attur Thanisandra Jakkuru	4		30
8	Bommanahalli	17	Uttarahalli Vasanthapur Konanakunte Arakere Hongasandra Begur	2		33

* Undeveloped park data only

** Not all the wards and areas will be taken

*** Data might vary after survey

★ **Third Phase**

(December, January, February):

Tree care maintenance and progress reporting *(wrapping up and completion)*

Routine care and maintenance of tree will preserve or improve its health, function and safety. Tree maintenance of tree completely dependence on the species, location of the tree, age and the care it receives. However, apart from these things there are certain regular inspections to determine a tree's needs, major are mulching, irrigation, pruning, fertilization. Each of these maintenance methods are attached in *Annexure III*

★ **Fourth Phase**

Evaluation of growth

(March, April, May):

First round of follow-ups

Trees do not require many materials to grow; in fact, they can be grown without the help of human hands. Unfortunately, for urban tree existing in towns and cities are not living on their own instead they have been living by the law of human supply and demand. These days' trees are also included as amenities, established by artificial habitat, and have been stressed by pollutants and by human-inflicted injuries. It is necessary to give urban trees special care, not only for their survival and for wellbeing but also to protect people.

Urban underground habitat is particularly ill suited for healthy tree growth. The soil is typically a mixture of subsoil, bedrock, construction waste and other pollutants, apart from this drainage is frequently so poor that routine water lands up to a water logging environment in which the roots are unable to grow. The nutrients level may be too low for normal tree growth or too high in sodium or other chemicals, which crashes the growth of the tree.

Trees healthy growth should be maintained and monitored at least 12 months to 18 months after plantation (*monitoring check list Annexure IV)*

- Watering regularly and accurately
- Trimming the dead, diseased limb and other issues which hinders the growth
- Clearing trash and weeds from around trunk base
- Mulching
- Report the conditions which require professional attention (diseases pests or damage)
- Immediate replacement of dead trees

BUDGET ESTIMATION

(First, Second, Third and Fourth Phase Only)

<table>
<tr><th colspan="3">Required fields</th><th>Cost</th></tr>
<tr><td colspan="3">Samplings (average price per plant 25Rs) 25x10000 (trees and shrubs)</td><td>Rs.2,50,000</td></tr>
<tr><td colspan="3">Plantation equipment’s</td><td>Rs.3,50,000</td></tr>
<tr><td colspan="3">Plantation materials</td><td>Rs.2,56,200</td></tr>
<tr><td colspan="3">Metal cage / Garden nets (250x7500)</td><td>Rs.17,50,000</td></tr>
<tr><td colspan="3">Organic manure</td><td>Rs.1,36,850</td></tr>
<tr><td colspan="3">Fertilizers and other pest control</td><td>Rs.35,000</td></tr>
<tr><td colspan="3">Clay pots</td><td>Rs.84,960</td></tr>
<tr><td colspan="3">Water (in tankers) (350rs per tanker) (5 tankers per day)</td><td>Rs.2,62,500</td></tr>
<tr><td colspan="3">Construction materials</td><td>Rs.1,15,000</td></tr>
<tr><td colspan="3">Labour charges</td><td>Rs.2,50,000</td></tr>
<tr><td colspan="3">Transportation chargers</td><td>Rs.95,000</td></tr>
<tr><td rowspan="4">Honorarium 18 Months

(Project care cost)</td><td>Position & Salary</td><td>No. of person</td><td rowspan="4">Rs.9,90,000</td></tr>
<tr><td>Project Manager Rs.20,000</td><td>One</td></tr>
<tr><td>Field Coordinator Rs.10,000</td><td>Two</td></tr>
<tr><td>Field worker Rs.5,000</td><td>Three</td></tr>
<tr><td colspan="3">Trainings programmes</td><td>Rs.1,45,000</td></tr>
<tr><td colspan="3">Other supportive events</td><td>Rs.45,000</td></tr>
<tr><td colspan="3">Miscellaneous</td><td>Rs.40,000</td></tr>
<tr><td colspan="3">Stationery requirements</td><td>Rs.25,000</td></tr>
<tr><td colspan="3">Total</td><td>Rs. 48,30,510</td></tr>
</table>

CONCLUSION

Street trees are important to our quality of life in the city. They are living elements of our street infrastructure. Located in the public right way, they provide cooling shade, pure air and many more beautiful urban street scapes. Trees are improving esthetical and ecological benefits to city residents. Thou the project assume that the changes would be created in the city after the plantation. But to have long term survival of the tree the support system around the tree also should be conscious about the care and maintenance of the trees, because trees living in the urban landscape face a variety of environmental distresses or physical stresses, such as: pedestrians and other vehicular traffic, polluted soil, air pollution and other irrigation issues, so it's a request to consider the growth and care of trees at our neighbourhood. All culture, ages, and genders have an important role to play at a tree planting or tree care event.

EXPECTED OUTCOME

The amount and quality of trees influence both biological and physical urban environments, because plants are strategically placed and cared, they start living with the technology, a major part of the urban infrastructure that contributes to the liveable urban places.

Enhanced qualities of life for future generation, all of the benefits of trees are increased as they grow. Planting trees is an investment in the **quality of life** we leave as legacy to future generations.

Cut in heating charges and increase free cooling: A 25-foot tree reduces annual heating and cooling costs of a typical residence, a mature tree reduces air temperature by about 5 to 10 ~F, and also influencing the internal temperature of nearby buildings.

Improved air quality: a typical person consumes about **386 lb** of oxygen per year, a healthy tree, if a 32ft tall tree can only produce about **260 lb** of oxygen each year. In addition, we get a cooler atmosphere with more trees.

Improved water quality: the canopy of a street intercepts rain, possibly reducing the amount of water that will fall on pavement.

Trees modify local climate: Trees help cool the "heat island" effect in our inner cities. These islands result from storage of thermal energy in concrete, steel and asphalt. Heat islands are 3 to 10 degrees warmer than the surrounding countryside. The collective effect of a large area of transpiring trees (evaporating water) reduces the air temperature in these areas.

Soil stabilization: tree roots stabilise soil, helping to minimize erosion.

Increase habitat: planting trees in an urban setting provides food and shelter for wildlife in the city.

Apart from creating healthy environment, it is an opportunity for community involvement and empowerment that improves the quality of life in our neighbourhoods.

LIMITATION

- Community support
- Water and planting materials
- Conducive climate conditions
- Existing environmental conditions or other structural conditions (sildewalks, eletricpoles, telephone or other wires, and other buildings)
- Maintain time frame
- Other likeminded organisations support
- Continuous support from the stakeholders
- Specific plant species
- Volunteers

ANNEXURE – I

- ***Training manual for tree plantation***
- ***Establishment of tree***
- ***Planting the Tree***

Planting can be done at any time of year; however, fall and early spring are the best times. Successful planting depends on the hole you dig. *Structural roots* anchor the tree and provide the framework for the absorbing roots. *Absorbing roots* are tiny roots found in the uppermost part of the soil. They provide the tree with water, air, and nutrients. Provide good conditions and your tree will grow fast and strong.

- **Digging the hole**

- Remove grass sod and dig a saucer shaped hole, wide at the edges.
- Pile soil in one area so it is easy to reuse.
- The hole should be three times as wide as the root ball and the depth of the root ball.
- Roughen the sides of the hole so roots can penetrate the soil.

- **Preparing the Roots**

- Gently massage the root ball until the roots are loosened.
- Remove any soil from above the root flare. The root flare is where the roots spread out from the trunk of the tree.
- Root tips die when exposed to excess light and air. Work quickly!

- **Placing the tree in the hole**

- Make a mound of soil in the middle of the hole to set the root flare even with the original grade around the tree.
- Spread the roots out in all directions.

- **Backfilling the hole with soil**

- Lightly press around the roots to collapse air pockets as you backfill with soil.
- Water thoroughly.

- **Mulching around the tree**

- Form a mulch ring around the tree keeping the mulch away from the trunk. Mulch helps by keeping out weeds, keeping the soil moist, and keeping grass trimmers away from the trunk. Mulching materials include compost, bark, wood chips etc
- Mulch should be about three to four inches deep. Form a three foot radius circle from the trunk the tree.

- **Staking the tree** ~ Stake only if necessary; do not use wire or anything that could cut into the bark. Ready-made tree ties work well. Staking should be removed after one year.

- **Fertilizing** ~ Do not fertilize the tree during the first year.

ANNEXURE II

- Plantation Standards
- Materials
- Planting Specification

List of shrubs

1.	Acalyphahispida
2.	Allamanda grandiflora
3	Barleriacristata
4.	Bauhinia tomerntosa
5.	Clerodendroninerme
6.	Dombeyaspectabilis
7.	Hameila patens
8	Hibiscus rosasinensis
9	Nerium oleander
10	Tecaomastans

List of climbers

1	Allamandacathartica
2.	Aspatagusdensiflorus
3	Ipomoea palmate

List of Trees

1	AlbiziaLebbeck	Baage
2.	AnthocephalusCadamba	Kadamba
3.	Bauhinia variegate & bauhinia purpurea	Basavanpaada
4.	BombaxMalabaricum	Booruga
5.	Brassaiaactinophylla	Umbrella tree
6.	Butea Frondosa	Muttuga
7.	Callistemon Lanceolatus	Bottle brush
8.	Careyaarborea	Kavala
9.	Cassia Fistula	Kakkemara
10.	Cassia javanica	
11.	Cassia siamea	SeemeTangdi
12.	Cassia Spectabilis	
13.	Castanospermumaustrale	Black bean
14.	Cochlospermumgossypium	arasinabooruga
15.	Cordiasebestena	Kempuchalle
16.	Colvillearacemosa	Hukuchinamara
17.	Couroupitaguianensis	Nagalinga
18.	Delonixregia	Kattikaimara
19	DoilchandronePlatycalyx	Nile tulip tree
20	Enterolobiumcyclocarpum	Elephant ear tree
21.	Erythrinaindica	halvana
22.	Firmianacolorata	
23.	Gliricidiasepium	Gobbaradamara
24.	Grevillearobusta	Silver oak
25.	Jacaranda mimosaefolia	
26.	Kigeliapinnata	Sasegamara
27.	Lagerstroemia flos-reginae	Hole dasavala
28.	MichaleaChampaca	Sampige
29.	Milletiaovalifolia	Moulmein rose wood

30	Millingtoniahortensis	Akashamallige
31.	Parkiabiglandulosa	shivalinga
32.	Peltophorumpterocarpum	Haladigulmohur
33.	Plumeria alba	kaadusampige
34.	Plumeriarubra	
35.	Pterospermumacerifolium	Naradu
36.	Saracaasoca	Ashoka
37.	Solanumgrandiflorum	Potato tree
38.	Spathodeacompanulata	Nirukaimara
39.	Tabebuiaargentea	The tree of gold
40	Tabebuiaavellanedae	Pink tabebuia

List of medicine plant / Tree. *Name of Plant - Hindi Name - English Name*

Acacia arabica - Babul - Gum Tree

Achyranthesaspera - Addhajira - Chaff Tree

Acorascalamus - Bach - Sweet Flag

Adathodavasica - Adusa - Malabar nut

Aegle marmelos - Bel - Bail fruit tree

Ageratum conyzoides - Ajgandha

Allium sativum - Lahsun - Garlic

Alocaciaindica - Ghuiyan

Aloe barbadense - Gwarpatha - Indian Aloe

Amaranthesvirdis - Choulai - Amaranth

Amorphaphalluscampanulatus - Soorankand

Andrographispaniculata - Kalmegh

Annona squamosa - Sarifa - Custard apple

Argemonemexicana - Pilikateri - Mexican poppy

Asperagusracemosus - Narbod - Wild Asperagus

Bauhinia variegata - Kachnaar - Moutain ebony

Boerhaaviadiffusa - Punarnava - Spreading Hogweed

Bryonialaciniosa - Shivlingi

Bryophyllumcalycinum - Khatua - Sprout leaf plant

Butea monosperma - Palas - Flame of Forest

Calotropisprocera -Akona - Madar

Carica papaya - Papita - Papaya

Carissa opaca -Van Karonda

Carumcaptivum - Ajwain - Bishop's weed

Casiatora - Teeti - Feted casia

Cassia fistula - Amaltaas - Pudding pipe tree

Catharanthesroseus - SadaBahaar

Centellaasiatica - Brahmi - Indian pennywort

Chlorophytumtuberosum - Safed musli

Cissusquadrangularis - Hadjori

Citrus medica - Neebu - Lemon

Clerginiaindica - JangaliPiyaz

Cocculushirsutus - Jaljamani

Convolvulus pluricaulis - Sankhpusphi

Coriandrumsativum -Dhania - Coriander

Curculigoorchoides - Kalimusli

Curcuma zedoaria - Kalihaldi

Cuscutareflexa - Amarbel - Dodder

Cymbopogoncitratus - Gautichai - Lemon grass

Cynodondactylon - Doob grass- Dog grass, creeping cynodon

Cyperusrotundus - Nagarmotha

Dalbergasisso - Shisam - Indian red wood

Datura alba - Dhatura - Thorn apple

Delonixregia - Gulmohar -Gold mohur

Derris indica - Karanj

Diascoreadaconona - Baichandi - Wild Yam

Emblicaofficinalis - Amla - EmblicAmla

Eucalyptus lanceolatus - Safeda - Eucalyptus

Euphorbia hirta - Dudhi

Ficusbengalensis - Bargad-,Bad Banyan

Ficuscarica - Anjeer - Fig

Ficusracemosa - Gular

Ficusreligiosa - Peepal - Pipal tree

Gossypiumhirsutum - Kapas - Cotton tree

Hemidesmusindicus - Anantmul - Indian sarparilla

Hibiscus rosa-sinensis - Jaswant, - China rose

Jasminumsambac - Mongra -Jasmine

Jatrophacurcas - Chandrajot

Lantana camera - Narangi Lantana

Launaeaacaulis - Musakani

Madhucaindica - Mahua

Mangiferaindica - Aam - Mango

Menthaarvensis - Pudina - Mint

Mimosa pudica - Chuimui - Sensitive plant

Mirabilis jalapa -Gulbans - 4'O clock plant

Momordicacharantia - Karela - Bitter gourd

Moringaoliefera - Munga - Horse redish tree

Mucunapruricus - Bach - Cowhage

Murrayakoenigi - MeethiNeem

Musa paradisica - Van kela - Banana

Neriumindicum - Kaner - Oleander

Ocimum sanctum - Tulsi - Basil

Phyllanthusnieuri - Bhuiaonla

Piper nigrum - Kali mirch - Black pepper

Plumbagozeylanica - Chitavar - Rove leadwort

Psidium guava - Amrud - Guava

Rauwolfiaserpentina - Sarpagandha

Ricinuscommunis - Arandi - Castor

Rutagraveolens - Shitaab

Salmaliamalabarica - Semul - Silk Cotton tree

Sarakaindica - Ashok - Jonesiaashoka

Saxifragaaligulata - Patharchata - Indian rockfoil

Semicarpusanacardium - Bhilwa

Shuteriahirsuta - Cheeval

Sidarhombifolia - Pithkarenti

Solanumnigrum - Makoy - Black night shade

Solanumxanthocarpum - Bhatkataiyan

Sonchusarvensis - Sahdehi

Swertiachirata - Chiraita - Chiretta

Syzigiumcumini - Jamun -Jambol

Tamarindusindicus - Imli - Tamrind

Tectonagrandis - Sagon - Teak tree

Terminalia arjun - Arjun

Terminalia bellarica - Baheda - Belericmyrabolam

Terminalia chebula - Harra - Myrabolam

Tinosporacordifolia - Giloy - Guduchi

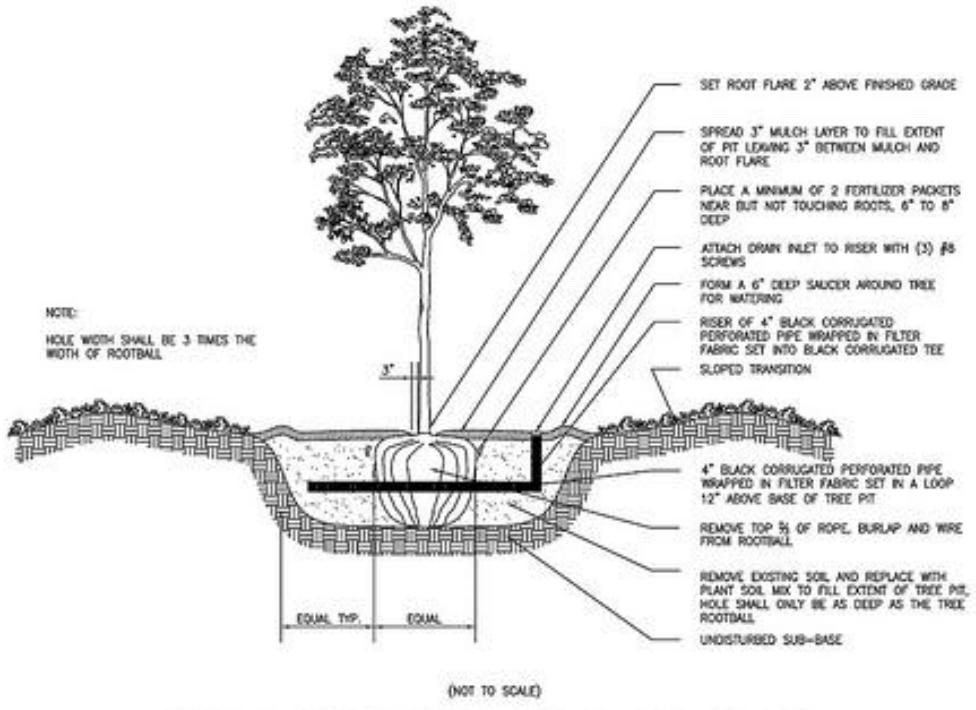
Tridaxprocumbens - Barahmasi

Vanda roxburghii - Banda -Vanda, orchid

Vernoniacinerea - Sahadehi

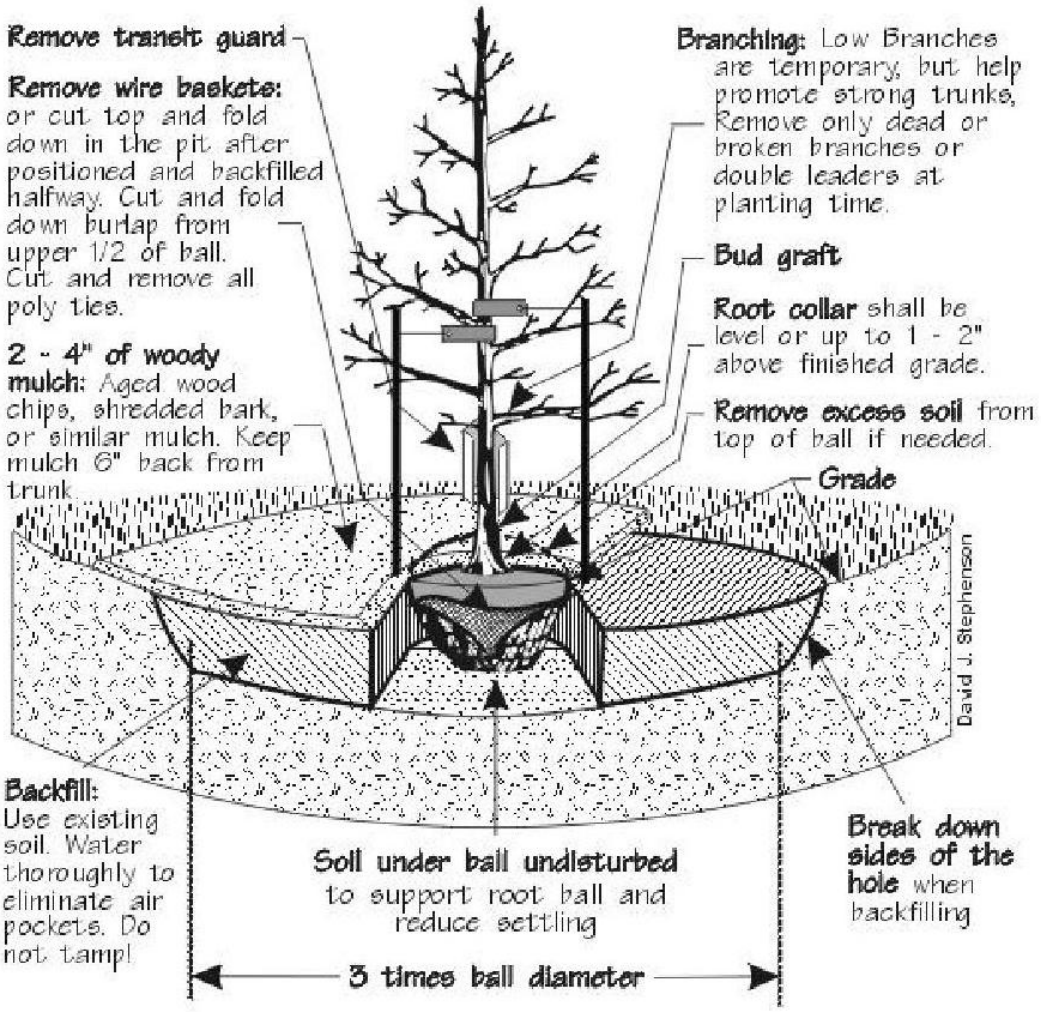
Zingiberofficinalis - Adrak - Ginger

Zizyphusjujuba - Ber Plum



(NOT TO SCALE)

TYPICAL TREE PLANTING IN PARK OR LAWN AREA



Stake only if you have to. Use 3"-wide webbing straps and secure to stakes with heavy gauge wire. The wire should be able to stick straight out from the stake and hold the webbing strap up, preventing it from sliding down the tree. Do not stake tightly - trees gain strength from movement. Remove all stakes after one year.

Design

- Spacing requirements

  Minimum distance between the trees shall be maintained, depending upon the tree species and other local conditions
- Tree pit dimensions

  The tree pits should be large as possible to allow for ample growing space for the tree roots and crown, and to prevent future side walk lifting. Optimal tree pit size would be 4 ft by 10 ft or 5 ft by 10ft.
- Species selection

  Species selection should take into account site conditions, designs goals, and diversity goals.in choosing a tree, the mature height and spread shall be considered to ensure that it will not interfere with existing or proposed structure and overhead utilise.
- Soil volume:

  Trees require adequate volumes of soil in whichtheir roots can expand, allowing for tree growth. If adequate soil volumes are not available throughout a tree's life, then much more intensive management is required, and the tree will be reduced in size, condition, and useful life span. It is very important to recognize that a tree's requirement for growing space and soil rooting volume increases as the tree ages and size increases. At the time they are planted, trees should be provided with enough growing space for their future mature size.
- Plant pest control requirements should work according to government prescribed limits.

Materials

- Plants
  a. Digging

     Digging a shallow and broad planting hole, the hole should be 2 to 3 times than the root ball, but only as deep as the root ball.

  b. Form and structure

     All tree shall have a single, straight trunk and be branched at least five feet from the ground. They shall hve normal, well developed branches and a fibrous root, they shall sound healthy, vigorous trees, free from defects, disfiguring knots, sunscald, injuries and other forms of infections

  c. Organic matter as described in methods of soil analysis
  d. Water
- Planting season

Refer the project timeline.

- Installation

  Be sure to remove all ties from around the trunk. Remove all wires, twine and wire baskets from the root ball. Gently pull the burlap away from the ball, ease the roots through the burlap and remove the burlap completely.

* Other maintenance activities refer annexure III

** Only a selected few and based on the availability of the sapling, the trees will be chosen to be planted

ANNEXURE III

- ***Tree care and maintenance***
- ***If trees are planted at the right depth and they are irrigated properly, the planting has a good chance of success.***

1. Tree Pruning

Pruning is the removal or shortening of tree branches to achieve a specific objective, means reduced tree size or spread, development of structural strength, improved tree health and appearance and better clearance. Regularly inspect trees to determine pruning.

Benefits

- Better tree form, health and structural strength
- Reduced risk of limb or stem breakage
- Improved clearance for pedestrians and vehicles
- Improved appearance
- Removal of dead, damaged and diseased branches
- Improve the appearance

Pruning Cuts

a) Visible branch collar: cut to the edge of, but outside of, the collar. Don't damage the branch collar.

b) No visible collar: begin the cut where the top of the branch makes an abrupt turn towards the trunk and cut outside an imaginary line drawn parallel to the trunk.

c) No visible collar and included bark: make the final pruning cut at the base of the actual connection between the branch and trunk

2. Tree Fertilization

Fertilization is the application of nutrients to the soil or plant leaves to enhance growth. It should only be done for a specific purpose ot to correct a specific deficiency identified through soil testing or foliar analysis.

3. Irrigation

Irrigation may be done simple using hose or any comfortable or dependent on the availability portability. Irrigation is most crucial to newly palnted water tank or installed low volume irrigation system. Well- established trees that are wel matched to site conditions doesn't require irrigation expect during extended dry periods.

The amount of water required for a tree depends upon its age, trunk diameter, soil type, environment conditions and the size of its root zone. Under certain circumstance, rainfall occurs irregularly during these situation trees require irrigation. When the tree growth rates become more or less consistent from one year to the next, the trees is considered established. Trees require about three ot four months per inch calliper to become established. Shrubs require about 20 to 28 weeks to become established. Once drought-tolerant plants like live oak, are established, they can withstand extended dry periods with little or no irrigation.

Irrigation events should be 2 to 3 gallons of water per inch trunk diameter. A 2 inch tree should be watered 4 to 6 gallons at each irrigation event. In the case of newly planted trees and shrubs, water should be applied directly to the root ball. Regular irrigation after planting encourages rapid root growth that is essential for tree establishment. Irrigation after planting encourages rapid root growth that is essential for tree establishment.

Short tip for irrigation

- Plant trees with the top of the root ball at slightly above ground surface level to avoid creating a place where excessive water may accumulate.
- Match tree species to soil moisture conditions, utilizing upland and drought tolerant trees where soil moisture is typically low and water tolerant species where soil moisture is typically high or where the site is frequently flooded.

4. Pest Management

Pest management is the control of weeds, insects, fungi, bacteria or other tree pests through a variety of techniques which is feasible, utilization of biological methods.

Benefits

- Increase in knowledge of impact and life cycle tree pests
- Reduction in the number of trees affected
- Increased tree health with timely pest identification and management

Short tip for pest management

- Plant trees where their needs will match the site conditions to prevent stress and predisposition of trees to pest attacks.
- Protect tree roots, trunks, and limbs from wounds, wounds are the entry points fro insects and diseases.

5. Tree replacement

The major gaol for removal and replacement are to maintain public safety. There are many reasons why trees must be removed. They may be growing in the wrong location, without adequate growing space and are in conflict with infrastructure. They may be old trees that are at the end of their normal life span. They may be dead or in poor or hazardous conditions, and may require removal to protect the safety of the owner or the public general.

Benefits

- Reduced risk of failure with the prudent removal of trees
- Reduced risk of pest infestations and damages to other trees
- Additional space for new, vigorously growing trees.

ANNEXURE IV

Monitoring checklist:

This work is the most and necessary to find out the potential problem and assist immediately, understanding and describing the issues which causes a problem at the growth of the tree. Major considering points would be looking for minuet symptoms, decaying tree truck, growth of mushroom or any other infections.

Looking for the following inspection facts and photography the damaged tree part, if in case not able to understand take a sample of the infected tree leaf or tree truck and arrange for the study to resolve the issue.

Name of the species:

- Pest or disease infestations
- Inhibited or stunted growth
- Binding or restriction due to stakes and ties
- Broken, dead, or diseased branches
- Wilted, curled, or distorted leaves or dried-out buds
- Leaf color abnormalities (spots, yellowing, or brown margins); early leaf drop
- Cracks in bark from sunburn
- Sucker growth at the base or on the sides of the tree's trunk
- Holes or substances oozing from the trunk
- A sickly appearance; lack of normal leaf luster or sheen
- A site that appears unmaintained or abandoned and invites vandalism
- Litter or weeds around the tree base

- Dead or dying trees nearby, which may infect surrounding vegetation
- Severe erosion, sunken holes in the root-ball area, or an inadequate watering basin that threatens the young tree's water supply
- Flooding or poor drainage
- Holes, gouges, or strange growths that might indicate disease or vandalism
- Surface roots beginning to grow
- Algae or mosses around tree base, indicating excess watering
- Burrowing rodents, such as gophers and ground squirrels
- A heavy layer of soot or particulate matter from air pollution (can be hosed off).

List of tree species.

Sl.no	**Scientific name**	**Native name**
1	Polyalthia longifolia	Indian mast/Ashoka
2.	Pogamia Pinnata	Honge
3.	Roystonea Regia	Royal Palm
4.	Markahamia lutea	Nile tulip
5.	Bauhinia variegata	Orchid tree
6.	Peltophorum pterocarpum	Copper pod
7.	Delonix regia	Gulmohar
8.	Tabebuia aurea	Golden bell (yellow flower)
9.	Tabebuia Avellanedae	Pink flower
9.	Millingtonia hortensis	Indian cork
10	Spathodea Campanulata	African tulip
11.	Parkia biglandulosa	Shivalinga
12.	Plumeria alba	Kaadusampige
13.	Samanea Saman	Male mara
14.	Swietenia macrophylla	Mahogany

- These are usually available in the Indian market and also meet the plantation standards according to *Annexure II*

ANNEXURE V

For more details about the plantation guide that is being practised in India, Please refer to the below site.

- http://cpwd.gov.in/Publication/LandscapeBook.pdf

This Project (MARA BELESI – MARA ULISI) will be executed based on the Plantation methods and details given in this book.

The following book is also inspiring this Project.

ANNEXURE VI

- Organisation Deed
- Tax Exemption Certificate
- Pan Card Copy