METHOD STATEMENT FOR TREE TRANSPLANTATION

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1. Introduction

Tree transplantation is the latest technology to suite the need to conserve trees. The trees are an important part of our ecosystem, and play a vital role in maintaining the biodiversity of the area. In order to facilitate construction of large-scale projects without cutting of trees, this technology has been developed. Due to the wide extent and morphology of tree root system, transplanting of trees usually involves substantial removal of roots. The whole transplanting process in particular for large trees is an engineering feat and requires substantial involvement of resources and time.

2. Season of Transplanting

2.1 Transplanting is done when there is enough moisture in the soil. Hence, monsoon is the right time as there is enough moisture in the soil.

2.2 Some species may survive transplanting any time during the year when the ground is not dry, but woody plants are preferably moved in the spring after the ground dries and before the buds on the tree or shrubs begin to swell.

2.3 They may also be moved in the fall after leaf drop but before the ground dries.

2.4 Fall planting should take place soon after leaf drop, providing time for new water absorb in roots to develop before the soil dries.

2.5 Since evergreens are especially prone to winter browning if planting is delayed until shortly before the ground freezes in the fall, they should be moved late in the summer to early rain fall.

2.6 Wood plants that are transplanted in late spring and early summer, when shoot growth is at its peak, tend to show the greatest transplant injury.

3. Main Procedure

During the process of transplantation, we see that the tree responds to a two-tier root system and a new system is then gradually encapsulated in a root ball. The entire method is divided into the following steps:

3.1 Initial Preparation

· Preliminary root investigation
· Health diagnosis of the tree
· Treating the infected trees

3.2 Soil Sampling, Testing & Site Selection

The condition of the soil where the tree has to be transplanted is thoroughly checked & necessary treatments are applied to the soil after digging a pit. The pit size has to be in accordance with the root ball of the tree. There are great differences in the environmental requirement for each tree. The light conditions, moisture, soil pH, wind exposure & improved drainage should be taken into consideration. All plants require space for root and crown development therefore adequate distance between other plants is necessary.

3.3 Preparation of root ball

Root pruning is sometimes required before transplanting a tree. Sufficient time should be allowed between preparation and final lifting for development of new roots capable of sustaining and continuing the growth of the transplanted tree.

The root system of a woodland or open-grown tree will normally be widespread. Lifting such trees without initial preparation of a root ball will result in much of the root system being left in the soil. After transplanting, the tree crown may then die back, or the tree may not be able to recover and will die eventually.

The root ball size varies depending on species, habit, location and specific attributes which shall be as large as practicable to maximize the potential of survival during and after transplanting while balancing other logistical and cost concerns. In general, the root ball diameter to tree diameter varies according to tree size. The root ball sizes should be of a diameter and depth to encompass enough of the root system as necessary for establishment. Normally the diameter of a root ball is larger than its depth which seldom exceeds 1 meter. There may be practical difficulties in forming a root ball of regular shape or recommended size due to intrinsic conditions of the site or tree, e.g., conflict with adjacent structures or utilities. In such cases the advice of a tree specialist has to be sought on the optimal dimensions of the root ball to be achieved specific to the situation.

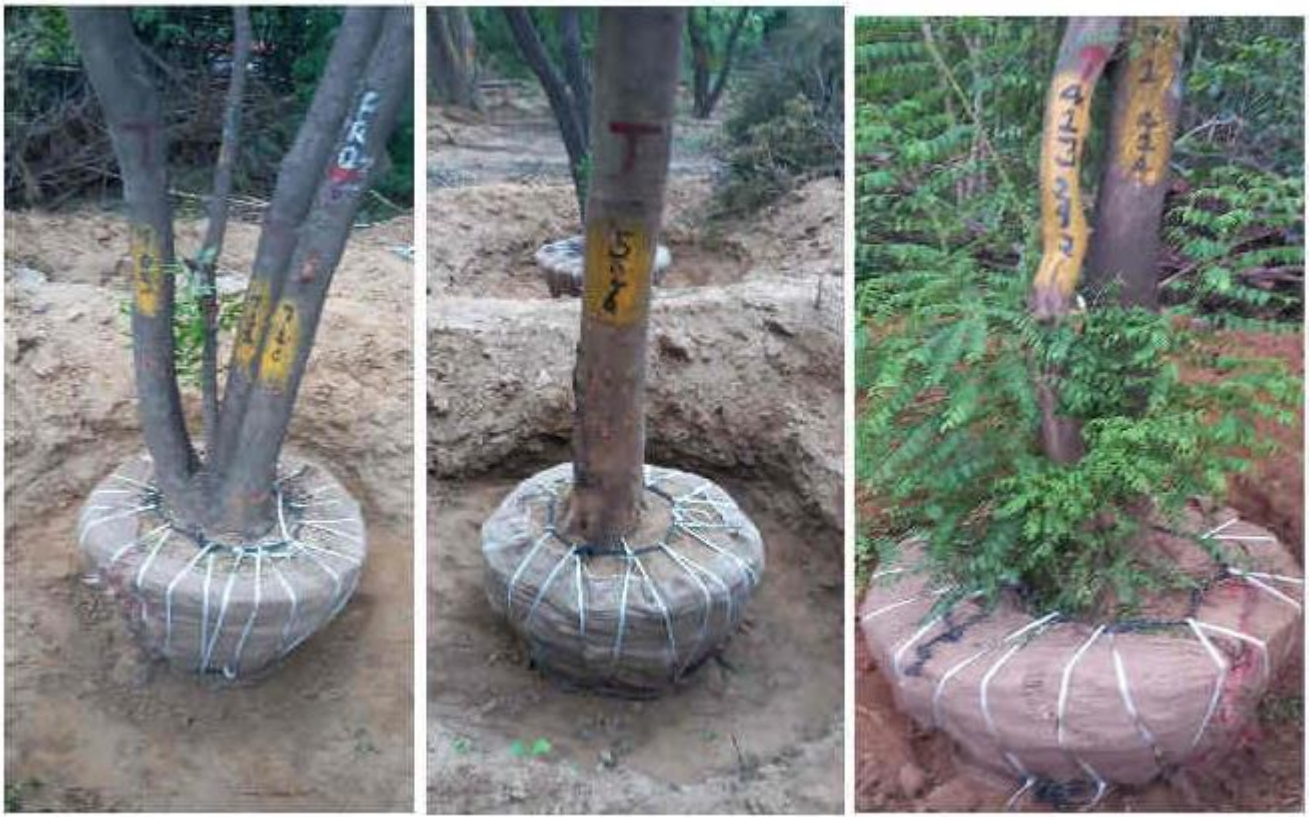


Fig:1 Tree Packing, feeding and monitoring - Packed Tree

Fig:2 Tree Packing, feeding and monitoring - Packed Tree

3.4 Initiating fresh root growth

The roots are systematically pruned in phases and to initiate fresh growth of roots and make the plant adapt itself gradually into a new routine whereby after cutting the roots, treat the cut parts and feed it with alternative methods. It is a gradual process and it takes about 3-4 months to actually pack a tree into a new system of living. Not a single root is left without cutting and initiating fresh growth of roots in a packed system. Since roots are cut in a phased manner labor is required all through this period. Also, before initiating root cutting process, make sure that the tree is not infected and if it is then treated accordingly.

3.4.1 Branches pruning and initiating fresh branch growth

The branches are systematically pruned in phases and to initiate fresh growth of branches and make the plant adapt itself gradually into a new routine whereby after pruning the branches treat the cut parts and feed it with alternative methods. It is a gradual process and it takes about 3-4 months to actually pack a tree into a new system of living. Since branches are cut in a phased manner labor is required all through this period. Also, before initiating branch pruning process, make sure that the tree is not infected and if it is then treated accordingly.

3.4.2 Tree Packing, Feeding and Monitoring for Adaptation

This involves packing of trees, timely feeding of the plant with soluble fertilizers and watering. There has to be regular monitoring regarding fertilizer schedules and the chemicals like insecticides, pesticides during the course for general treatment. Simultaneously expert staff is to sew packing material properly and tightly according to the root requirement. Now since plant is packed in the same environment it needs external support to remain in the same position without falling down because of wind pressure. Scaffolding is required for about one and a half to three months depending upon the condition of the tree for each transplanted tree to give it external support.

3.5 Transplantation of Trees

Crane is required to lift the packed tree and usually a trolley or truck is used to transport the tree depending upon its size from its original location to the place where it is to be transplanted. JCB is used for digging pits. Pruning may be required depending upon the size of the root ball, the plant canopy, health of the plant, species transplanted or because of overhead wires and spread of the road while transplantation of the tree. After about 3 months we lift the tree with the help of crane.

- Plant should be bodily lifted with as many roots as possible and taken to the new position immediately. Ball of earth surrounding the root should be also be lifted.

- Cover the root ball with damp material which will retain moisture (burlap, peat moss, canvas, plastic, etc.) until planting.

- Plastic should only be used in shaded areas for less than a day or heat injury and/or root suffocation may occur.

- When a tree or shrub is stored, it should be protected from direct sunlight, winds, and temperature extremes. If any woody plants cannot be planted for more than a week, their roots should be covered with a match or moist soil and the plants should be placed in a shades area.

- In all cases root systems should not be allowed to dry out. Dry roots can severely decrease the potential for transplant success.

- Roots should not be injured, It must be cut so that the amount of water absorbed in the new site can be checked. There is a change in the environment, thus more amount of water might create problems.

- If the earth breaks away from the root area, it must be smeared with clay, cow dung and water.

- The entire plant is then placed within the pit and fine soil can be added. Finally good soil will cover up the root. The replanting is to be done to the same depth as at the old location.

- Broken limbs should be removed and leaf area to be removed and leaf area to be reduced to check vapor-transpiration. At the same time branches have to be cut back.

4. Machinery and Manpower Requirement

- One water tanker with driver and labor.
- One labour for lopping branches at uprooting sites.
- One labour for treatment to the pit at transplanting site.
- Spray pump, bucket, hand glows, shovel and branch cutting/lopping instrument.
- Necessary fertilizers, insecticides.

4.1 Lifting & Pruning

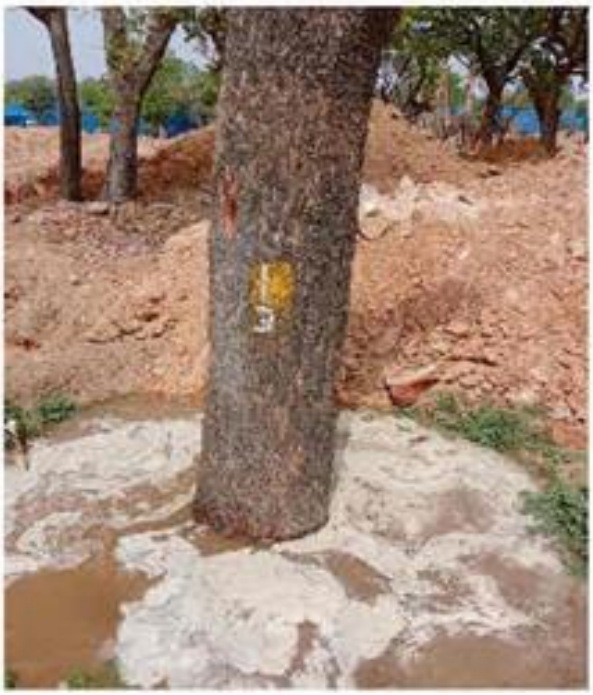
Tree lifting operations shall be carefully timed so as to enable direct delivery to the receptor site. No transplanting operations should commence until either the receptor site or the holding nursery is fully prepared. Tree uplifted must be transplanted and watered the same day. Watering before lifting is recommended. Before uplifting, the outer edge of the previously dug trenches shall be loosened from the surrounding soil, and the root ball can be shaped with taper on the sides, slanting inward toward the base. The first cut around the perimeter of the root ball should be made with a sharp tool. Cuts should be clean to avoid tearing or breaking the roots. The shaping and final cuts should be done by hand. Do not stand on the root ball during the process. The root ball should stand on a pedestal of soil for shaping and bur lapping before it is undercut.

4.2 Protection during transportation

Trees are often too tall to be transplanted in the upright position and are tipped to a horizontal position. Root ball may be flattened during transportation. When trees are being loaded on a lorry or trailer bed, care must be taken to avoid injuring the tree or breaking the soil ball. Crown of the tree should be carefully wrapped to minimize the risk of drying, branch damage due to excessive movements, and wind damage, The tree branches can be tied, without breaking them, to enable smooth movement. The vehicle should move at such a speed which should not cause any injury to the tree. All the overhead cables/wires/obstacles should be kept free all along the route. The traffic police should facilitate smooth movement of the vehicle.

5. Post Transplanting Care

After transplanting it should be watered thoroughly. 2-3 watering per week during first month and then after 1 watering per week for 1 month is found suitable. It also observed at the leaves shed off in 1 month. New leaves sprout thereafter.



6. Post Transplantation Treatments

6.1Watering

- Too much or too little water after transplanting is a major cause of tree or shrub loss. The site should be thoroughly watered immediately after planting.
- Thereafter, the soil must be regularly monitored to prevent drying out.
- If rainfall is inadequate, the soil around the plant's roots should be deeply watered approximately every 10 -14 days.
- If unsure if the soil is drying, dig down 3 to 4" next to the plant. Wet soil at that depth verifies watering is not needed at that time.

Insect infested stems or those infected with disease should be removed doing transplanting and treatment given. Any broken stems during transplant should be removed cautiously. Sometimes, additional pruning may be required to balance the leaf area with the reduced size of root system.

NAME	CHEMICAL	ACTIVE INGREDIENT	QUANTITY per TREE
Anti-termite	Chlorpyrifos 20% EC	4 ml/3 L water	8 L
Antibacterial	Bactinash 200	17 gms /3 L	2 L
Antifungal	Corbondazim (Bavistin)	2 gms / 3 L water	15 L
Root hormone	IBA	20 ppm	20 L
Vermi-compost	..	15-25 kg / pit	..

Plant protection measures can be taken depending on the pest/disease. Growth regulators can be used if necessary. Mild pruning of those branches which are injured or damaged during transport may be done, to avoid further infection. Apply dung paste or neem paste to the abrasions or injured portions of the trunk or branches. Water spray can be given if the weather is very harsh. Fertilizers and nutritional supplements can be given to enhance its establishment.

All newly planted trees are subject to stress until a normal spreading root system has developed. The primary objective of planting site preparation is to provide a quantity of backfill soil that promotes rapid initial root development and does not restrict root spread beyond the planting hole.

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If rainfall is inadequate, the soil around the plant's roots should be deeply watered approximately every 10 -14 days.

If unsure if the soil is drying, dig down 3 to 4" next to the plant. Wet soil at that depth verifies watering is not needed at that time.

6.2 Pruning

- Pruning may be required when transplanting trees or shrubs. The amount of pruning depends on the size of the root ball and plant canopy, health of the plant, and the species transplanted.

- Insect infested stems or those infected with disease should be removed during transplanting.

- Any broken stems should be removed as well.

- Additional pruning of shrubs may be required to balance the leaf area with the reduced size of the root system, but further pruning of deciduous trees should be postponed for at least one year after transplanting.

- Pruning of conifers should be limited to diseased, insect, and broken limbs. If additional pruning of conifers is necessary, it should be limited to one-year-old wood whenever possible.

- Late season plantings may require additional pruning since the plants have less time to become established before winter than those planted earlier in the season.

Watering the transplanted trees

Transplanted Trees

7. Observations and Monitoring

The transplanted tree needs to be observed on daily basis for its survival, growth, pests, diseases and other physiological symptoms/ expressions. It is possible to witness temporary wilting of leaves for few days, leaf fall also can happen and the tree may even decide to go in for 'Transitory Dormancy' phase, to avoid moisture loss and desiccation. But can show revival symptoms within weeks like, new sprouts, turgid leaves, arrest of leaf fall, etc., It is also possible that sometimes, there will be a 'Distress' reaction in the form of premature flowering and fruiting.

Also, some trees will exhibit new sprouts within few weeks which may be due to the presence of adequate stored food reserves. Under such circumstances, the new sprouts will not survive for a long and may wither soon. If the tree has not acclimatized, then there will not be any revival symptoms. It should be kept in mind that the transplanted tree has to withstand the tests of at least one year (covering all the three seasons) to declare it as 'surviving or successful.

8. Safety Precautions

Tree transplanting, like other tree management works, should be conducted in a controlled and safe manner. Workers who are involved in transplanting trees should be given adequate instruction and supervision to ensure that tasks are completed in a safe manner.

The sites shall be inspected for possible hazards prior to beginning any transplanting procedure. The location of utilities and other obstructions 4 both below and above ground shall be taken into consideration prior to transplanting any tree.

9. Sources of procurement & specifications

S.NO.	DESCRIPTION OF CHEMICALS	SOURCES OF PROCUREMENT	SPECIFICATIONS	REMARKS
1	Anti-Termite	Durmet Tc (chlorpyrifos 20% EC)	Durmet to contains chlorpyriphos 20% ec technical which has been known for its effective control against termites since decades. Durmet to shall be applied at 1% concentration (1 1 of durmet to in 191 of water) to get desired control.	
2	Anti-Bacterial	Bactinash 200	2 BROMO-2-NITROPROPANE-1, 3-DIOL 95%W/W This is an ideal bactericide against bacterial leaf blight black arm disease, citrus canker for cotton, citrus, paddy, chilies, betel vine, tomato, banana, grape, vegetables, potato, flowers and fruit crops dosage: -5-6gm/20ltrs of water	
3	Anti-Fungal Chemicals	Bavistin fungicides	It is systemic fungicide can be use for all major types of fungicidal problem like damping off, leaf spot, scab, anthracnose, sheath blight, powdery leaf spot, scab in all types of crops dosage-2.5-3 gms/ltr of water.	
4	Root Hormones	Saridex, Root+Gro	Root Gro + is a Natural and Advanced Root enhancer and plant growth regulator. Humic Acid + Fulvic Acid (Dry Basis)-82% min Organic Potash (as K20)-8%	

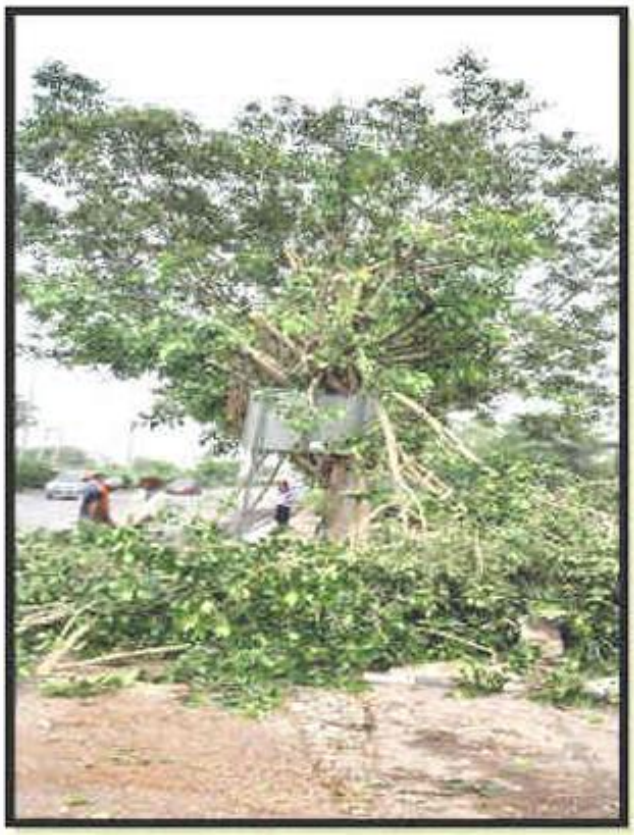
			min Seaweed Extract-4% Matter insoluble in water 1.0% max	
5	Vermi-Compost	Prepare vermin-compost from cow dung, vegetable waste, cow urine and water	Vermicompost is nothing but the excreta of earthworms, which is rich in humus and nutrients. We can rear earthworms artificially in a brick tank or near the stem/trunk of trees (especially horticultural trees). By feeding these earthworms with biomass and watching properly the food (bio-mass) of earthworms, we can produce the required quantities of vermicompost.	

10. Disposal Mechanism I Procedure

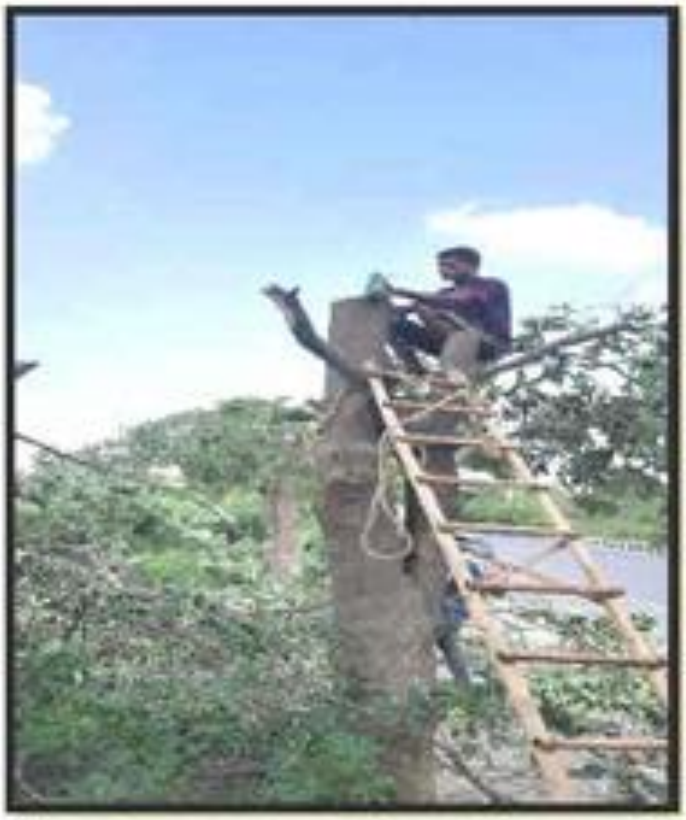
TREE LEAVES: - Let the leaves degrade or return to the earth. Blow leaves into the natural areas where they will decompose and continue the circle of life.

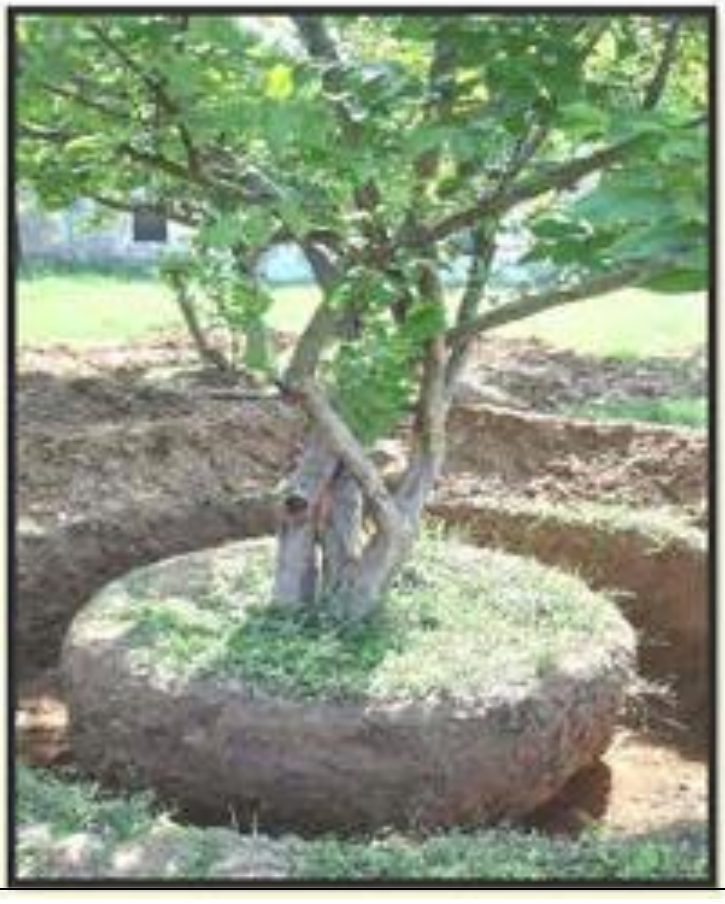
BRANCHES: - Branches of the trees after pruning /cutting shall be transported to the cremation.

1. Brandies pruning and initiating fresh branch growth



2.TREE BALL PREPARATIONAND CHEMICAL APLLY ON ROOT

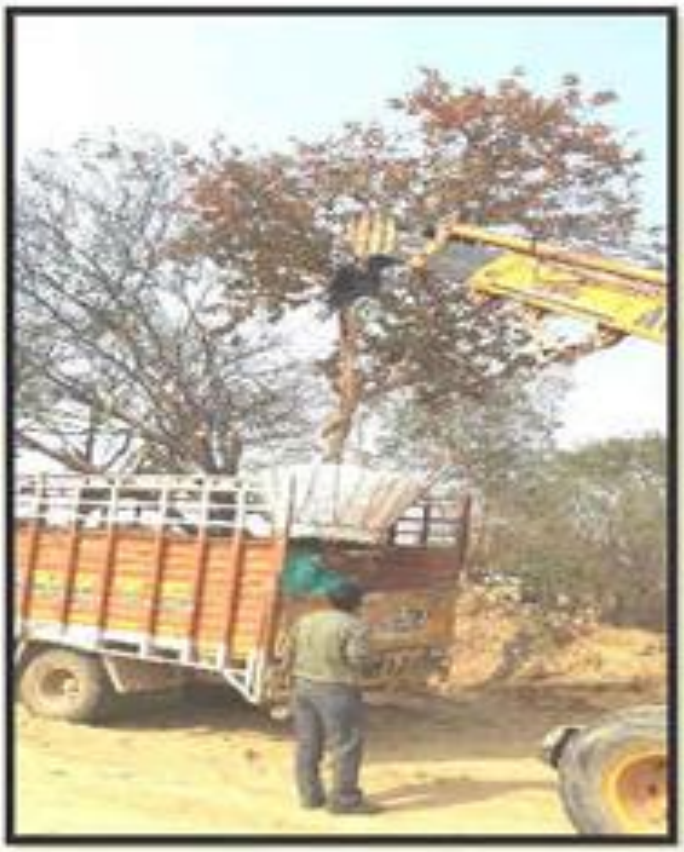


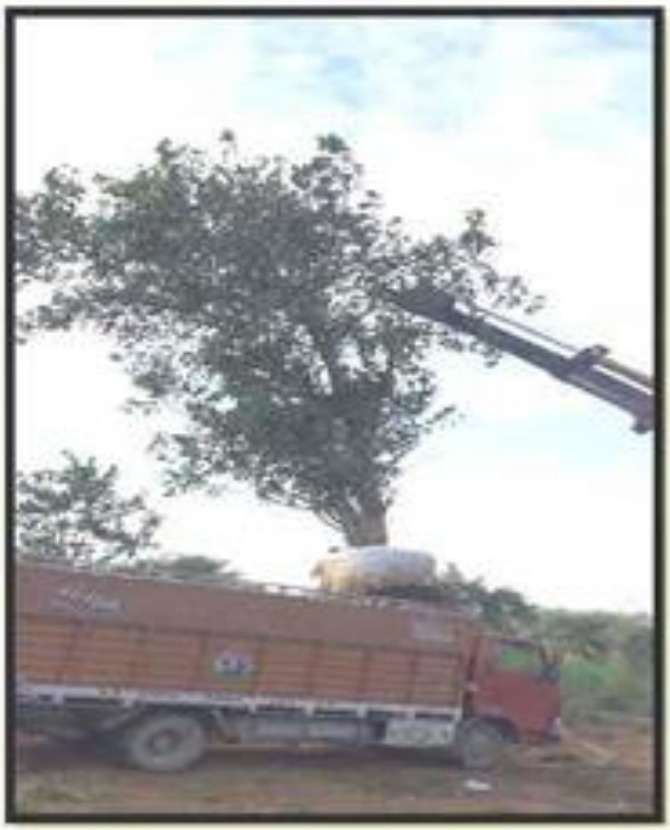


3. TREE PACKING, FEEDING AND MONITORING FOR ADAPTATION

4. TRANSPLANTATION OF TREES LIFTING

Cover the root hall with damp material which will retain moisture (burlap, peat, moss, canvas. plastic, etc.) until planting.



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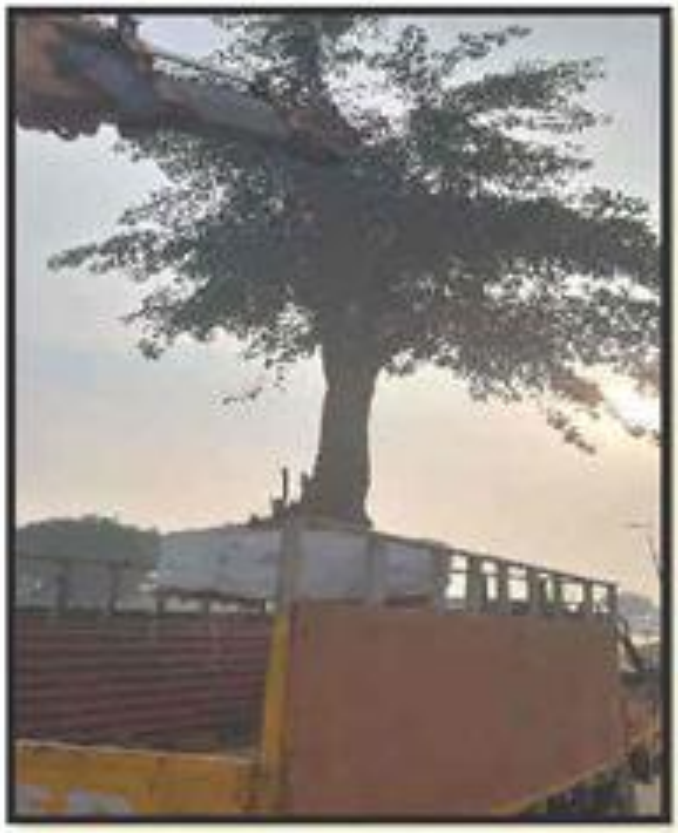
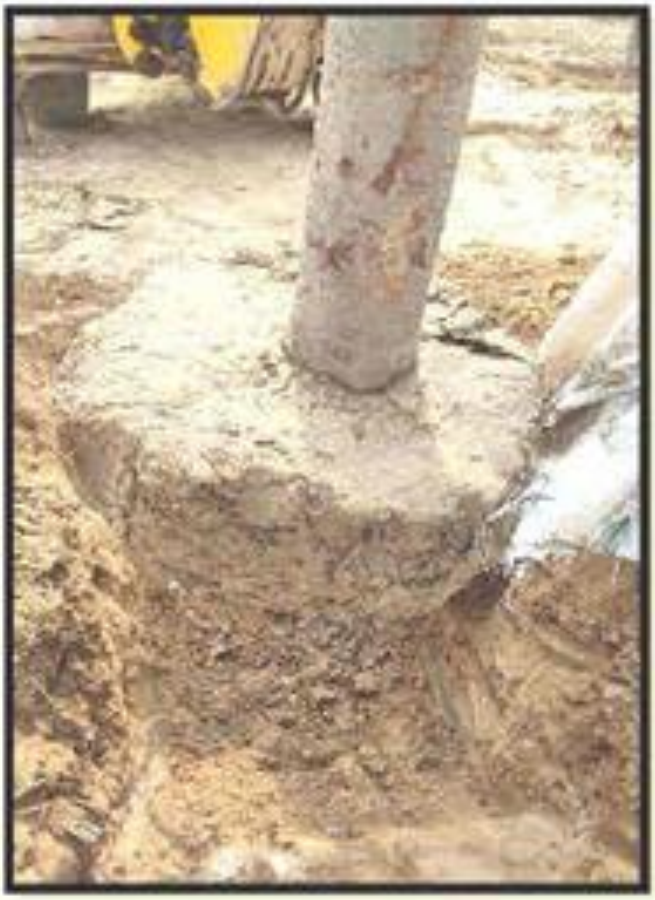
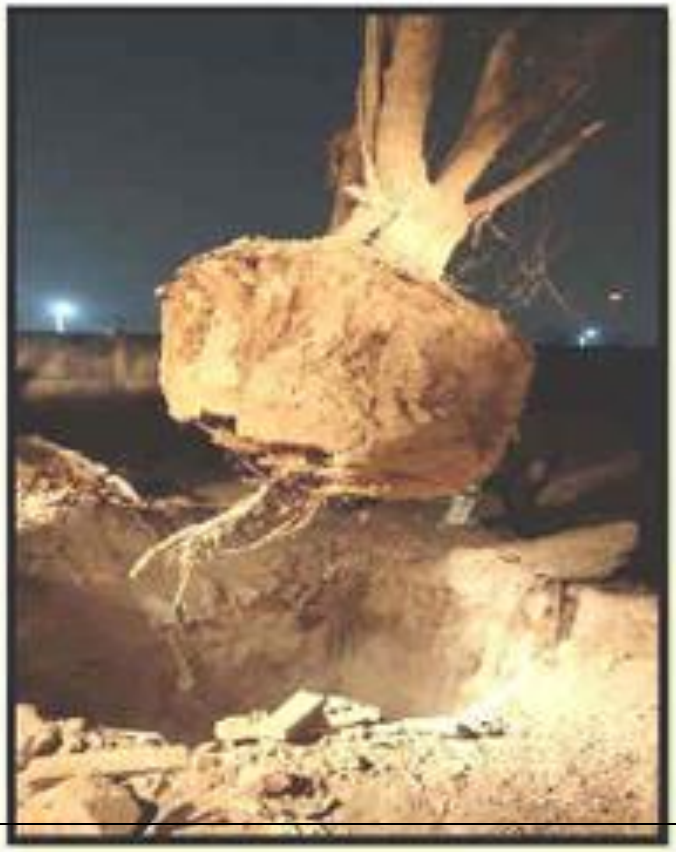
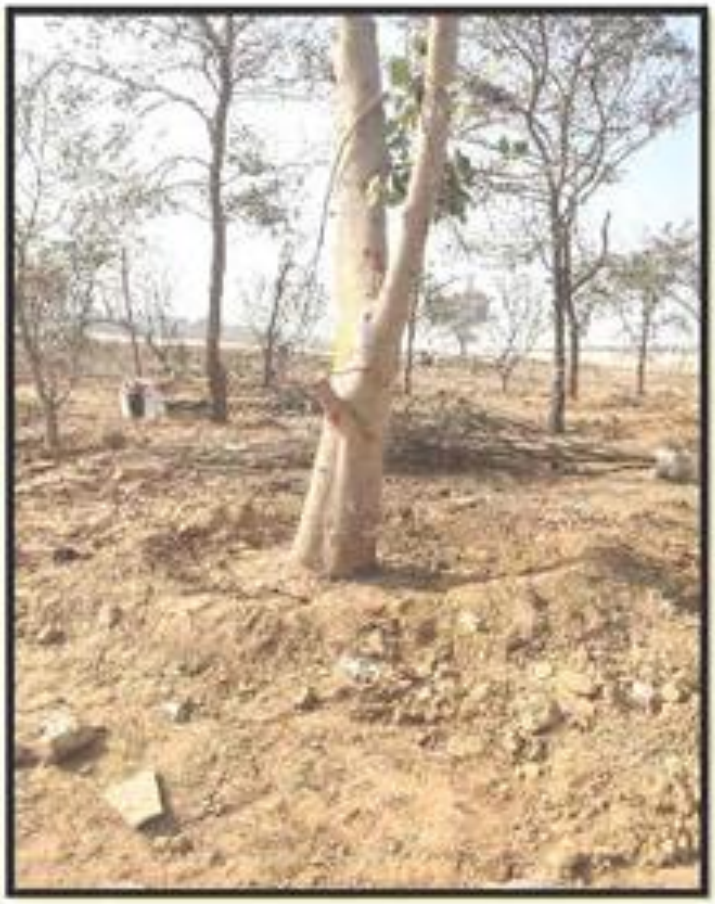


5. TRANSPLANTATION OF TREES LOWERING





6. WATERING



7. TRANSPLANTED TREES