CHAPTER 5

FORMULATION OF DESIGN GUIDELINES
5.1 Design Guidelines and Recommendations

This chapter is purely based on the above two experiments done on the hospitals in both external and internal spaces.

The following recommendations are made with respect to the results obtained in this research. The major divisions in recommendations are: 1. Internal Landscaping Design and 2. External Landscaping Design.

5.2 External Landscaping Design

The following are the guidelines recommended for the external landscaping for a hospital premises.

1. Preserving natural vegetation and landforms – This is the first and foremost recommendation any landscape architect will do.
2. Allotting the ratio 1:2.5 between area of the vegetation and the area of the total open spaces of the hospital premises.
3. Using the plants which are experimented in the Laboratory tests (Experiment No. 2) of this research and select the plants according to the hierarchical order done in Chapter No. 4 (Page No.126)
4. It is recommended to further calculate the ratio according to the requirement of the premises. The vegetation taken into consideration are coming into five categories – according the five senses of the human being. The ratio of the five senses may also be designed with respect to the necessity and the requirement of the respective site and environment. For example, if the site of a hospital premises is located in a highly noise polluted area, the percentage allotted for the ‘sound absorbance’ may be higher than the other four categories. But how much higher precisely must be allotted – is the other question for which the calculation is required.
5. Preserving the existing trees, regardless of size and age, unless the trees are proven to be harmful to the living beings, especially to the patients.
6. Articulating the spatial relationships to provide the image and structure to the built environment.
7. Mixing a variety of plant materials due to possible insect infestation that potentially could destroy a significant portion of a particular species.
8. Providing large deciduous trees such as Polyalthia longifolia (Ashoka tree), Terminalia arjuna (Arjuna tree), Shorea robusta (Sal tree), etc to obtain unity, character and identity for hospital premises with respect to the human scale.

9. Planting evergreen trees such as Azadirasta indica (neem tree), Ficus religiousa (Peepal tree) etc., to screen and define spaces to control views.

10. Ensuring service reliability, it’s important to maintain safe clearances between trees and distribution lines on the street, as well as the service line from the street to your home. If tree branches rub against power lines, they may wear away the protective weather coating and cause service interruptions. Branches that touch power lines can become electrified and hazardous to anyone climbing the tree. In rainy or icy weather, trunks and lower tree limbs could also become electrified because water conducts electricity. During high winds, thunderstorms, and snow or ice storms, large trees and overhanging branches can fall and damage overhead electric lines, which could result in extended power outages affecting widespread areas.

11. For all of these reasons, the first thing to consider when choosing a tree to plant below or beside a power line is the size. For instance, under power lines, it’s better to choose short trees. A good rule of thumb is to select trees whose mature height is less than 6 meters.

12. Considering both the underground and overhead space the tree will occupy.

13. Making sure you provide adequate space for rooting, drainage, and oxygen so that your tree will develop properly.

14. Remembering that branches of trees planted too close to your home can cause expensive damage to your roof and siding, not to mention clog gutters with fallen leaves. In addition, it’s better not to forget that storms can cause limbs and even entire trees to fall onto houses and power lines, causing major damage and disrupting electric service.

15. Planning for adequate rooting space — especially in paved areas. It’s better not to want the tree to cause a cracked driveway or sidewalk. Besides being expensive to repair, cracked pavement is hazardous to pedestrians.

16. It’s better not to plant along important sight lines. Overhanging limbs can obscure street lights, signs and traffic signals or any other sign boards within the premises.

17. Reviewing your municipality’s infrastructure to ensure that tree roots don’t interfere with underground water, sewer, or natural gas lines and septic tanks.
18. Planting or trimming a tree may seem easy enough. But working in that can lead to accident or injury. Here are some important health and safety for planting vegetation in external landscaping:
   a. If using a ladder or other garden tool, stay a good distance away from overhead power lines. Contact with an electric line could prove fatal.
   b. It’s better to stay away from trees with overhead electrical lines running through them.
   c. It’s better to not touch a tree limb that’s in contact with a power line.
   d. It’s better to make sure children don’t climb, build tree houses, or play in a tree near overhead electrical lines.
   e. If a kite gets tangled in power lines or in a tree branch near power lines, It’s better to leave it alone rather than risk accident and injury.

19. Pad-mounted transformers are three-foot-square, green, metal boxes containing equipment that supplies many neighborhoods with underground electric service. The safety rules to follow when working or planting around these boxes are:
   a. It’s better to not try to conceal pad-mounted transformers with plants, trees, shrubs, or structures.
   b. Trees, shrubs, and structures should be placed at least 10 feet from the front opening of a pad-mounted transformer and three feet from the remaining three sides.
   c. It’s better to not change the ground levels around a pad-mounted transformer.
   d. When planting or building near this equipment, It’s better to be aware that high-voltage, underground wires are connected to each pad-mounted transformer.

20. Local weather and soil conditions, the size and shape of the tree, as well as planting location are factors to consider when planting a tree. Regardless of the specifics, the following tips should help ensure proper planting:
   a. It’s better to plant only as deep as the root ball of the tree.
   b. It’s better to make the planting hole twice as wide as the root ball.
   c. It’s better to brace the tree only if it will not remain upright in a moderate wind.
   d. Staking or bracing the tree too tightly must be avoided.
   e. Allowing the tree to sway gently to develop trunk taper is important to growing a strong, mature tree.
f. Bracing with materials will not injure the bark. It can be purchased bracing material from the nursery or use wire covered with hose. It’s better to remove bracing materials after one year.

g. Mulching adequately to insulate the soil, retain moisture, block weeds, and add an aesthetic touch to a yard or street is important.

h. It’s better to keep the soil moist, but don’t waterlog.

i. It’s better to remove dead and dying branches from the tree.

j. Waiting until the second growing season before fertilizing and shaping is good.

21. If purchased a bare-root tree, it’s best to plant it immediately to keep fragile roots from drying out. If weather or soil conditions prevent you from planting, it’s better to store the tree in a cool place and keep the roots moist.

22. If a tree is planted correctly, it will grow twice as fast and live at least twice as long as one that is planted incorrectly. Ideally, the hole you dig should have sloped sides, be bigger than twice the diameter of the ball, and no deeper than the depth of the root ball.

23. Recommended techniques and procedures for new trees to be planted in the premises:
   a. Being gentle with a new tree.
   b. Picking up the tree by the root ball or container, never by the stem or trunk.
   c. Most trees don’t require staking. If staking is required for protection or stability, using tree strapping or hose-covered wire is recommended.
   d. Leaving a one-inch space between hose and all sides of trees and removal after one year are recommended
   e. The hole should be twice the diameter of the root ball with sloped sides, and no deeper than the depth of the root ball.
   f. Soil Mixture - Four parts by volume of topsoil mixed with one part decomposed organic materials; firm soil around ball. It’s better to expand beyond planting pit as shown when no topsoil is present.
   g. 50mm – 100mm of Woody Mulch - Aged wood chips, shredded bark, or similar mulch. Never mound mulch at tree trunk. Water thoroughly to eliminate air pockets, settling, and to soak the ball and the surrounding soil.
   h. 50mm X 50mm Hardwood Stakes - May be left to provide physical protection to the tree trunk and bark. The top of the tree ball should be slightly higher than the surrounding finish grade.
i. **Fold Wire Baskets** - It’s better to cut top and fold down in the pit after positioning for back-fill planting. Planting base of undisturbed soil to support root ball and reduce settling.

j. **Caliper** - It’s better to use 50mm or greater. Diameter measured 200mm above root fare. Cut and remove burlap from upper 1/3 of ball. It’s better to cut and remove all poly ties and burlap.

k. **Transit Trunk Guards** - Removing immediately after planting is required.

l. **Branching** - Minimum clear stem height 1.5 meter. It’s better to remove lower branches in successive years to provide additional clearance for vehicles and people.

24. With early care and special attention, a young tree will develop its unique character and enhance your property. The cost of caring for young trees is minimal. In fact, proper planting, watering, mulching, and pruning techniques are about the only requirements for trees to grow to maturity.

25. When it comes to watering trees, remember these three points:
   a. Young trees require sufficient water until their roots are able to tap available groundwater.
   b. It’s better to make every effort to water existing trees during periods of drought.
   c. Watering deeply and slowly is important.

26. A tree’s best maintenance, mulch performs many different functions:
   a. insulates soil
   b. retains moisture
   c. raises soil temperature
   d. keeps out weeds
   e. prevents soil compaction
   f. reduces lawn mower and string trimmer damage
   g. adds an aesthetic touch to a yard or street
   h. It’s required to remove any grass within the mulch area, which could be anywhere from three to 3 meter in diameter, depending on the size of the tree. Pour wood chips or bark pieces 50mm to 100mm deep within the circle, but not touching the tree. It’s better to keep mulch less than six inches deep. In the case of mulch, more isn’t better.
27. Understanding how and where roots grow will help you avoid damage from trenching and construction. Here are some facts to remember: Because roots need oxygen, they don’t normally grow in the compacted oxygen-poor soil under paved streets.

28. Roots often grow outward to a diameter of one to two times the height of the tree. Eighty-five percent of a tree’s roots are located within 200mm to 600mm of the surface.

29. Pruning: Pruning is important to ensure the health of a tree, as well as to safeguard public safety and maintain visibility. By using the natural pruning method, you maintain the natural shape of a tree or shrub.

30. To use this method you need to know two terms. The first term is branch bark ridge, the raised bar area between the limb and the parent stem, be it the remainder of the limb left or the tree trunk.

31. The second term is branch collar, the enlarged area just outside of the branch bark ridge which is actually part of the tree trunk or parent limb. Whether pruning is done for a small branch or removing a large limb, it’s required to identify these two areas so you make the proper pruning cut.

32. To prune small branches, it must be located and identified the branch collar and, using the pruning diagram, make the final cut just outside the branch collar. Making the proper cut and avoiding damage to the branch collar will allow compartmentalization, a process that lets a tree set up internal zones of protection to inhibit spread of decay.

33. Compartmentalization can only occur when the branch collar has not been damaged by stubbing or flush cutting. Since the branch collar is actually part of the tree trunk, cutting into or damaging the branch collar is harmful to the tree trunk and may cause long-term tree health problems.

34. To ensure the long-term health of your investment, and because properly pruned trees require less frequent pruning, it is required to hire an experienced tree contractor to do the job.

35. Topping trees must be avoided. Many arborists agree that topping, or pruning large upright branches between nodes (where branches meet other branches or the tree trunk), is one of the worst things you can do for the health of a tree.

36. If a tree is topped, ugly, weakly attached limbs will often grow back higher than the original branches. Topping can also lead to tree decay.

37. It’s better to avoid tipping, or cutting lateral branches between nodes, to reduce crown width. Like topping, tipping is a practice that harms trees. It leads to unsightly sprouting and death of some cut branches.
38. It’s better to never remove more than a third of the tree’s crown.
39. Flushing cutting to the tree trunk, ripping branches away from the tree, and stub cutting can harm trees by causing decay or by delaying or preventing proper healing.
40. It’s better to not apply tree paint or wound dressing to pruning cuts. Research indicates that they do not prevent decay or promote rapid wound closure.
41. Successful landscaping involves learning how to properly plant your shrubbery and trees. Taking just a little extra time to study planting procedures may save a considerable amount of time and money later on. To have a healthy landscape and reduce maintenance, you must have a good design, proper site, proper planting, and good follow-up care. Here are some important methods for you to learn and remember.
   a. Even though most landscape plants can be planted any month during the year, the ideal planting season begins in October and continues until new growth appears in the spring.
   b. Early fall planting is most desirable. Roots grow during fall and winter months, enabling them to become established before warm weather and spring growth.
   c. Plant deciduous trees and shrubs (those that lose their leaves in the fall) after they become dormant (November to January).
   d. Shrubs and trees grown in containers may be planted throughout the spring and summer if plants are watered properly. With extra care, balled and burlapped plants can be planted in spring and summer, but the risk of the plants dying increases.
   e. Carefully considering the planting sites is important. Picking a place that meets the light requirements for the plants you have chosen or select plants are adapted to the level of light received in the area to be planted.
   f. It’s better to remember to consider other environmental factors such as typical wind velocity, temperatures, soil characteristics, and amount of rainfall.
   g. It’s better to make sure the plants you choose will adapt to each of these conditions.
   h. The only way to know what nutrients your soil needs for growing ornamentals and whether the soil pH needs correcting is to test the soil.
   i. For best results, spending the little extra money needed to buy some good organic matter, or better yet, begin collecting and preparing own composted organic matter.
   j. Organic matter helps the root growth of your ornamentals in several ways.
k. It loosens tight clay soils and causes loose sandy soils to hold more water for a longer period of time. There are several good organic materials. Peat moss is ideal for most ornamentals.
l. Ground pine bark is also very good. Leaf mold from the woods and compost are satisfactory as well.

42. Sawdust is used by a number of Tropical nurseries. However, sawdust can rob the soil of its nitrogen supply. If this happens, plant leaves will turn light yellow.

43. Peanut hulls can be bought in some areas of the state, and they may be used. However, they should be composted or treated to reduce the possibility of adding nematodes to your soil.

44. If a bed of ornamentals is to be planted, it’s better to put 2 to 3 inches of organic matter on the soil surface. Then working it in to a depth of 8 to 10 inches is must.

45. If planting a single plant, digging the hole twice the width of the root ball is must. It’s better to make the hole no deeper than the height of the root ball; in fact, in most soils the hole should be shallower than the height of the root ball. The sides of the hole should slant slightly outward from bottom to top. For root balls greater than

46. 500mm in diameter, dig holes 500mm wider than the diameter of the ball. For individual plantings, soil amendment is not needed. After planting, the top of the ball should be 25mm to 50mm higher than ground level or even with the ground level in sandy soils.

47. It’s better to place the plant in the center of the hole and, using the native soil, refill around the sides one-half to two-thirds to the top of the ball. With the shovel handle, tamp the soil downward and under the ball. Lightly firm the remaining soil toward the ball with your foot. Filling the hole with water and allow it to settle will remove air pockets.

48. With the remaining mixture, it’s better to finish refilling the hole but not firm the soil. Applying 50mm to 75mm of mulch around the base of the plant is must.

49. It is not necessary to remove the burlap from balled and bur lapped plants if real, untreated burlap is used. It will decompose in a short time. However, It’s better to make several slits through the burlap on the sides of the ball after the plant has been set in the planting hole so that the roots may penetrate more quickly or fold the burlap away from the ball into the bottom of the hole.
50. Other plastic or synthetic materials do not decompose and should be dropped to the bottom of the hole. It’s better to cut strings that are wrapped around the base of the plant.

51. It’s better to follow these good planting steps for balled and bur lapped plants.
   a. Handling plant ball carefully and not lifting it by the stem.
   b. Digging a hole deep and wide enough for the ball and stem (no deeper than the ball).
   c. Leaving burlap on the root ball or remove other material; cutting rope or string at the stem.
   d. Filling the hole and firm the soil gradually with your hand or foot.
   e. Watering thoroughly.
   f. Covering area with 75mm of mulch.

52. Bare-root plants must have their roots spread out to full length to take the greatest advantage of moisture and fertilizer. Transplant bare-root plants only from October through January.

53. It’s better to follow these good planting steps for bare-root plants.
   a. Storing bare-root plant in shade and keep moist until planting.
   b. Removal of plant from package.
   c. Soaking roots in water.
   d. Digging a hole deep and wide enough to spread roots their full length.
   e. Spreading roots at 150mm depth.
   f. Filling the hole and firm the soil gradually.
   g. Watering thoroughly.
   h. Covering area with 50mm to 75mm of mulch.

54. It’s better to follow these good planting steps for container-grown plants.
   a. Handling plant by container.
   b. Digging a hole twice the width of the root ball.
   c. Removing the container carefully.
   d. Massaging the root ball to loosen mass slightly.
   e. Filling the hole and firm the soil gradually with your hand or foot.
   f. Watering thoroughly; make sure surrounding soil is wet.
   g. Covering the area with 50mm to 75mm of mulch.
   h. Watering every 2 to 3 days for the first 3 to 4 weeks; then being sure plants are watered about once a week.
55. One of the greatest drawbacks to successful gardening is poorly drained ground. Wherever water lies in the ground at a depth easily reached by the roots, cultivated plants will not survive.

56. Once a bed settles it needs to have good surface drainage (no standing water). Many times poor drainage can be corrected by anticipating the problem and raising the bed 50mm to 75mm to allow run-off.

57. Sometimes the drainage problem will be more serious, and internal drainage must be improved.

58. After the shrubs or trees are planted, there are several important things to remember. Young transplanted ornamentals need special attention the first year in their new location. Some trees may need to be staked, and all plants should be properly watered and mulched.

59. Trees planted in open areas subject to strong winds should be staked or guyed. Stake all trees that have a diameter of 30mm or less with 50mm x 50mm stakes. They should be long enough for you to drive them 600mm into the ground and still reach mid-height of the tree.

60. Soft twine, water hose, strips of webbing, or soft rope may be used to tie the tree to the stakes. If wire is used, pad it at the point of contact with the tree. It’s better to not leave wire on the tree more than 1 year or long enough to cause girdling.

61. It’s better to guy all trees more than 30mm in diameter with three or four guys equally spaced around the tree. It’s better to use two strands of No. 12 wire. Cover the wire with rubber hose or heavy cloth padding at points of contact.

62. It’s better to run wires from the trunk about 3 meters above the ground at an angle of about 45 degrees to stakes driven in the ground.

63. Trees should be staked so as to allow some movement of the trunk. Trunk movement allows the tree to increase in taper and develop a strong trunk.

64. Applying water slowly so it can soak into the soil in a 15 meter hose and sprinkler will generally take about 2 1/2 hours to apply the amount of water needed for a 100-square meter area.

65. It’s better to wet soil thoroughly to a depth of 200mm to 300mm inches. Light watering encourages shallow root development. Then, if the shallow watering is neglected a day or so in a sudden period of hot weather, plants may be damaged.

66. Avoiding too much water leaches plant nutrients from the soil and may drown the plant’s root system.
67. Avoiding setting plants so close to a wall that the gutter or over hanging roof blocks natural rainfall is good.

68. Mulching offers several advantages over clean cultivation. The greatest is the conservation of soil moisture. Evaporation of water from the soil is greatly reduced when the soil is protected from the direct rays of sun and moving air.

69. Also, rain falling on the mulch does not pack the soil surface. With less crusty soil, water that is applied penetrates the soil more easily, thus erosion is eliminated.

70. A second important advantage of mulch is the control of weeds. Using mulch greatly reduces the need for weeding. If herbicide is used that kills weeds before germination, the benefit in weed control will be even greater.

71. Controlling soil temperatures is another advantage. High summer temperatures may injure beneficial microorganisms as well as the roots near the surface of the soil. Maintaining lower and more uniform soil temperatures in summer will promote bacterial activity in the soil. In winter, frost penetration is less likely to occur where mulching is practiced.

72. Evergreens must absorb moisture in the winter as well as summer. Therefore, winter mulch may prevent the soil water from freezing and becoming unavailable to plants.

73. These advantages of mulching far outweigh the disadvantages, but there are a few. First, the cost and unavailability of some materials can be a drawback to large-scale mulching.

74. When using sawdust as a mulch, nitrogen starvation sometimes occurs. However, this is easily corrected by using additional nitrogen when needed.

75. Heavy mulching over a period of years may result in a buildup of soil over the crown area of plants. This condition is especially harmful to camellias. After the first 3 years, it may be advisable to rake off the old mulch before applying a new layer to prevent the roots from becoming too deeply buried.

76. Ornamental plants require nutrients for healthy growth. Soils are not well fertilized seldom contain sufficient plant nutrients.

77. Different soils contain varying amounts of nutrients. Therefore, one soil or area may require larger amounts of fertilizer than another to grow plants well.

78. Insects and diseases must be controlled to grow trees and shrubs successfully. Some pests attack roots; others feed on leaves and stems or damage flowers. One of the most important steps in the control of insects and diseases is to prevent infestation in the beginning.
79. It’s better to buy well-grown plants from a reputable nursery. Inspect plants frequently for signs of diseases and insects.

80. Most weed control around the home is the hand pulling method. However, the best control is a good mulching program with hand pulling as needed.

81. Mow the lawn using the following types of lawn mowers. Lawn mowers are available in two types: walk-behind mowers and riding mowers. Though the method of control is different, both types of mowers present similar hazards to operators, bystanders, and animals that may be in the immediate vicinity. Rotary blades located underneath the mower rotate approximately 200 kilometers per hour or 100 meter per second. Though somewhat protected with guards, all mowers are potentially dangerous when the operator does not use good judgment or fails to follow safety procedures.

82. It’s better to walk-behind mowers can be extremely dangerous to operators and bystanders when safety guards are removed, safety shut-down devices are disabled, and when mowers are operated in unsafe manner or environment. It’s better to practice the following safety tips to prevent injury:

a. Doing a walk-through of the yard prior to mowing. Removing any debris and obstructions including toys, limbs, rocks, wire, or glass. Locating all sprinkler heads, exposed electrical wire or cords, tree stumps, or exposed roots and pipe.

b. Keeping hands and feet away from the blade area while the mower is running.

c. Not reaching underneath or into the discharge chute to clear away grass or other obstructions when the blades are turning.

d. Wearing boots or shoes with good traction to avoid slipping and falling.

e. Never allowing young children to operate a walk-behind mower that they cannot safely control.

f. Being careful when refueling a hot engine. Use a funnel to avoid spilling fuel. Clean up any fuel spills immediately.

g. Never smoking while servicing, operating, and refueling a mower.

h. Wearing proper protection against flying debris and noise (long pants, hard shoes, safety glasses, ear plugs, etc.)

i. Allowing the engine to cool before storing it in a storage shed.

j. Turning the power off and disconnect the spark plug wire from the spark plug before cleaning, inspecting, adjusting, or repairing the cutting blade.

k. Never running a gasoline powered mower inside a storage shed; this could cause carbon dioxide poisoning.
l. Never touching the spark plug with your hand or a tool when the mower is operating.

m. Never leaving a running mower unattended, especially when children are around.

n. Never mowing a wet lawn. Losing control from slipping on rain-soaked grass is the leading cause of foot injury caused by power mowers.

O. When using an electric mower, keep the cord behind you. Trail it over your shoulder and mow away from the cord, never toward it.

83. New riding mowers come equipped with seat safety switches that stop the cutting blades from turning whenever the driver leaves the seat. Some riding mowers also have safety interlocks that will not allow the mower to be started unless all controls are in proper position and the driver is in the seat. In addition to the safety tips listed for walk-behind mowers, riding mower operators should take additional precautions.

a. It’s better to not allow extra riders.

b. Testing drive the mower, and become familiar with it before engaging the mower blade.

c. Putting the riding mower into neutral before starting it of shutting off.

d. Watching out for holes and hidden hazards.

e. It’s better to not drive too close to a creek or ditch, and be mindful of any obstructions.

f. Making sure the transmission is out of gear and the mower blade clutch is disengaged before starting the engine.

g. Keeping the mower in gear when going down slopes.

h. Slowing down when turning and when working on slopes.

i. Always looking behind before backing the mower.

j. Disengaging mower blade when on pavement, sidewalks or gravel lanes.

k. It’s better to not operate a riding mower when under the influence of alcohol or other drugs that impair judgment.

l. It’s better to not let children play in the lawn where you are mowing; they could be struck by flying objects.

m. It’s better to not let children operate riding mowers until they can safely steer, brake, and adjust gears, and until they have had proper instruction.

84. CONCLUSION:

a. All the above mentioned maintenance - care must be followed in the premises.
b. Selection of vegetation is the design of the landscape.

c. The ratio of the required species depends on the design of the landscape of the premises.

d. Pruning, Mulching, watering and insect control are the very vital measures in the maintenance of the landscape.

5.3 Internal Landscaping Design

The following are the guidelines recommended for the internal landscaping for a hospital

1. It’s better to provide landscape design is functional, aesthetically beneficial, cost effective and environmentally sensitive.
2. Providing the internal vegetation in the ratio of 1:0.459 which is the ratio between the volume of the room and the volume of the vegetation.
3. It’s better to bring the outdoors in without being hindered by heavy drapery, dark colors, and blocked views. Greenery can be enjoyed on the inside of your rooms, but will still need ample light.
4. If a room seems too dark to sustain a healthy plant, it does not mean that the room cannot hold indoor plants. Most indoor plants originate in tropical and subtropical regions, in particular equatorial forests, and they thrive in dim environments and filtered light. The ideal spot is in front of a large window facing east or west, filtered if necessary through a net scrim curtain.
5. If a plant that thrives on lots of sun, it’s better to place it on a windowsill facing north or north-east. Checking soil moisture levels regularly and inspecting the leaves to check they are not being burned. At the slightest sign of withering, move the plant towards the middle of the room.
6. Ferns and other moisture-loving plants do best in vaporous rooms like bathrooms where they can lap up regular doses of mist.
7. Watering poured directly onto the soil may flood, or not reach the pot plant's roots. Instead, watering plants bottom up by standing them in a dish and filling the dish with water. Delicate plants such as fuchsias thrive on this method. For this method to work, all pots should have holes in the bottom through which the water is absorbed.
8. If the plant must not be dead, it’s better to avoid placing it in draughty areas or near ducted heat or air-conditioning outlets.
9. Plants must be watered only when the potting mix feels dry to the touch – over watering is often the cause of indoor plant death. Checking by pushing your finger into the soil; if it comes out without any trace of soil on it, start watering. Remember that plants may need more frequent watering in summer.

10. Most indoor plants benefit from an occasional misting of water. Making sure the water is at room temperature and use an atomizer or spray bottle. Misting is particularly beneficial if you live in a centrally heated or air-conditioned house as the air can become very dry.

11. Feeding the plants with small amounts of fertilizer. The fastest and simplest solution is complete liquid fertilizer in the recommended dose, usually every two to four weeks – check the label.

12. An efficient way to water your plants directly at a steady rate is to use ice cubes. Putting a couple on top of the pot soil and leave them to melt.

13. Propagating house plants is a rewarding experience. And the rewards of making leaf cuttings sprout or a stem cutting take root are even greater when you can share these free plants with friends and neighbors.

14. By far the most common method of propagating house plants is by taking cuttings...stem, leaf, or root.
   a. Stem Cuttings
      i. Taking a cutting from a plant means removing part of the parent plant to grow a new one.
      ii. Once a stem is cut, its moisture supply is cut off. So the moisture level needs to be maintained while the cutting grows its own roots.
      iii. Some plants root so easily that the cutting can simply be placed in a glass of water. Others need help from a rooting hormone powder.
      iv. Spring and summer are the best times to take cuttings, because the plant is actively growing.
   b. Leaf Cuttings
      i. Propagation by leaf cutting is easy to do.
      ii. African violet is best known for this, but leaf cutting also works well for rex begonias, kalanchoes, and some peperomias.
      iii. Using a sharp knife or razor blade to cut the leaf stem about 1 inch below the leaf. Insert the stem just below the surface of moist potting mix at a 45° angle, taking care to keep the leaf above the potting mix. Once the
plantlets form at the base of the cutting, cut away the parent leaf and pot in fresh potting mix.

iv. The leaves of Sansevieria trifasciata (also known as mother-in-law's tongue) can be propagated from only a section of a leaf. Cut the leaf into horizontal two-inch sections, taking care to keep them the same way up that they were growing, and insert each section into moist potting mix about one-third of its depth. Two or three plantlets will form from each leaf section.

c. Root Cuttings
   i. To propagate a plant from a root cutting, insert the root pieces vertically in moist potting mix, keeping the ends that were closest to the crown at the top. When plantlets form, pot them in fresh potting mix.

d. Division
   i. Dividing works well for mature plants that grow in a clump, such as peace lily (Spathiphyllum wallisii) and mother-in-law's tongue (Sansevieria trifasciata).

15. Propagating house plants this way is one of the easiest methods -- and the messiest. Remove the plant from its pot and lay it on a flat surface. Carefully pull the roots apart, trying to do as little damage as possible. It’s better to use a sharp knife for dense roots, taking care not to cut more than is necessary. The new plants can be planted into separate pots a little bigger than their root system.

16. The options for house plant pots and containers are wide. Just about any box, basket, pot or dish is a possibility for plants.
   a. Whatever its size or shape, the container must have drainage holes in the bottom to allow excess water to escape. If a decorative container is used that doesn't have drainage -- often called a cachepot -- It’s better to slip a plastic container with holes inside the cachepot.
   b. It is good to use pebbles in the bottom of cachepots so that the plants are not sitting in water.
   c. Choosing a container that not only complements your decorating style, but suits your plant as well.
   d. The container should be proportionate to the plant. Basically, it’s better to choose the smallest container that will accommodate the roots of the plant.
Moisture will be absorbed quickly in a small pot, preventing it from getting waterlogged. A too-large pot will retain too much water.

17. Plastic house plant pots are light-weight and low-cost, making them a popular choice for indoor gardeners.
   a. They're time-savers, too. Since plastic pots are not porous like clay, soil will retain moisture longer and your plants will need watering less often. There is one hitch, though. Because air cannot circulate through plastic pots, it’s better to use a potting mix that drains well.
   b. Many plastic pots have Snap-On trays, which do a great job of catching water that drips from the bottom of the pots -- a must-have feature for hanging baskets.
   c. Since self-watering containers hit the scene several years ago, they've come a long way in form and function. They truly cut down on watering chores and are worth seeking out.

18. Simple clay flower pots come in just about every size and depth. They're inexpensive and easy to find at garden centers and nurseries. These clay pots also have drainage holes -- a must -- to prevent the plant from becoming waterlogged. Being sure to slip a saucer under the pot to catch any drips that come through the bottom.
   a. Another big advantage of terra cotta is that it's porous, allowing moisture to evaporate from the soil so that roots can get the oxygen they need. New terra cotta pots are so dry that they can steal water from the soil you put in them, leaving the plants thirsty. It’s a good idea to soak the pots overnight before planting in them.
   b. Being aware that a plant in a porous clay pot will need watered more frequently than one in a plastic or glazed container.
   c. This type is ideal for house plants that don't like a lot of moisture in the soil, such as cacti and other succulents. In fact, I can't imagine planting a cactus in anything else.

19. **Light** - Most flowering plants need to be within 1000mm of a sunny window. Most plants require 12 to 16 hours of light per day.
   a. Plants need adequate light in order to grow. They can be categorized into one of 3 groups depending on their light needs: Low light tolerant plants, medium light plants, or high light requiring plants. When selecting plants, make certain the one you purchase will do well in your location. To assist you in this process, Molbak’s color codes their indoor plant price tags for each of these light groups:
a green tag indicates a low light tolerant plant, a white tag is for medium light plants, and yellow indicates high light.

b. **Low Light Tolerant Plants** do well in northern exposures and in the interior of a room. A good rule of thumb to use in determining whether the light is sufficient for these plants is to see if you could read a book comfortably in that location without turning on a light. If not, then a plant would also need additional light in order to grow.

c. **Medium Light Plants** grow well in eastern exposures or close to western or southern exposures. Many low light plants will also thrive in medium light areas, but medium light plants grow poorly in low light areas.

d. **High Light Requirement Plants** are those plants which need up to 4 hours of direct sunlight. Unobstructed southern or western exposures are ideal for these plants. High light areas tend to be more stressful on plants than medium or low light areas. Plant health depends on quality of light as well as quantity of light. Natural daylight can be mixed with fluorescent or incandescent light to increase the quantity of light available to the plants, but some daylight is necessary for light quality. If trying to maintain foliage plants under artificial light, the light source needs to be close to the plant and left on for 12 to 16 hours a day, 7 days a week.

20. **Water** - In late fall, water houseplants sparingly until the light begins to increase in the New Year.

   a. More houseplants die from overwatering than from anything else.

   b. Watering plants with room-temperature water.

   c. Adding a few drops of ammonia to one quart of water used for houseplants; it will improve foliage color and increase growth.

   d. Watering houseplants in unglazed clay pots frequently.

   e. Frequent misting under the leaves of houseplants will discourage spider mites.

   f. If the houseplant leaves are dripping, even when it is watered, it's trying to rid itself of excess water (called "guttation"). This makes a plant vulnerable to disease-causing bacteria, so you'll want to avoid this problem by reducing the amount of water you're giving the plant, especially in these winter months. Also, watch those drips because they contain salts, sugars, and other organics that could stain whatever it is they're dripping on.
21. **Humidity** - Most houseplants are happiest when the relative humidity is 50 percent or higher.
   a. Group houseplants near each other to form a support group to cope with the low humidity of most winter homes.
   b. Fertilizer
   c. Fertilize your houseplants frequently to ensure vigorous growth.
   d. In winter, however, feed sparingly; house plants will be sensitive to overfeeding at this time of year.
   e. Humidity and temperature are interrelated; plants can withstand higher temperatures if the humidity is also higher. Humidity is increased by room humidifiers, plant groupings, misting, or humidity trays. Humidity trays are the most effective after room humidifiers. A humidity tray is simply a deep, oversized saucer filled with pebbles. Place the plant on top of the pebbles and fill the saucer with water to a point below the bottom of the pot. The water will evaporate from the tray adding moisture to the air around the plant. The lowest temperature most houseplants will tolerate living in is 50-55°F.

22. **Pests** - To get rid of bugs in houseplants, push a clove of garlic into the plant's soil. If the garlic sprouts and grows, just cut it back.
   a. Spider mites are apt to thrive in warm, dry houses. Frequent misting under the leaves of houseplants will discourage them. A solution of 1 cup flour, 1/4 cup buttermilk, and a gallon of cool water, applied in a mist, is a good organic deterrent.
   b. The houseplants may sprout bugs once brought inside your house because they no longer have outdoor predators.
   c. Remove aphids from houseplants with a mixture of equal parts rubbing alcohol and water and add a drop of dishwashing detergent. Apply this to troubled plants with a soft brush.
   d. Check your plants regularly for insect pests. If you suspect an insect infestation have the insect identified so that you can properly control it. Washing leaves with soap and water can help prevent serious infestations. When a more direct control is needed, you must treat at least 3 times, allowing 7-10 days between treatments to gain control. Insecticides only kill the adult stage of insects so any eggs that hatch must be eliminated before they lay more eggs. Frequency and coverage are the keys to success in spraying. Most insecticides are contact
killers so you have to wet all leaf surfaces and stems with the spray. The soil should be moist when you spray to lessen the possibility of burning the foliage. Choice of chemicals is important, too. Systemic insecticides put in the soil do not work on very woody plants or on a plant that is not actively growing. Always read the label before using any product. Be sure the product is labeled for the pest you are trying to control.

23. Winter Months - In colder regions of Tamil Nadu or Chennai, houseplants that have been outside for the summer should be brought in at the end of July. A sudden cold spell will be too much of a shock for them to survive. This is also a good time to take cuttings.

a. It's also good to bring in plants before you start heating your home. This gives them a chance to adjust. Wash them thoroughly before bringing them in to rid them of any pests and eggs.

b. It’s better to dig up your rosemary, basil, tarragon, oregano, marjoram, English thyme, parsley, and chives to grow them inside as houseplants. Keep them in a cool, sunny spot, and allow the soil to dry out before watering. Snip off the leaves as needed in the kitchen, but do not strip them completely.

c. Divide and re-pot any pot-bound plants so they will grow well during spring and summer. Prune judiciously to create a compact, attractive specimen.

d. Provide extra protection to houseplants on window sills if it is very cold. Place cardboard between the plants and the glass. Be sure the plants don't touch the windowpanes.

e. As houseplants are growing more slowly in December light, cut down on watering by half until active growth resumes. Hold off on fertilizing as well.

f. If the plants seem a little worse for the winter, provide lots of sunlight, fresh air, and frequent bathing.

24. Starting seeds is not complicated or difficult, if you understand the process. The basic ingredients are a proper growing medium, containers, light, warmth, water and attention.

25. Growing medium. Seedlings are very delicate. For the best chance of success, start them in a fresh, sterile seed-starting mix that is light and fluffy to hold just enough moisture. If the growing medium is too wet or not sterile, disease can strike. If it is too
heavy or sticky, fine new roots won't be able to push through it. You can use bagged seed-starting mix, or buy compressed pellets of peat or coir (coconut husk fibers) that expand when wet. Since seeds contain the nutrients the seedlings will need, fertilizer isn't important in your seed-starting mix.

26. **Fertilizer:** Feed with a balanced houseplant fertilizer as directed on the label, from March through October. The frequency and strength depends on the fertilizer being used and the amount of light the plant received. Plants in lower light do not use as much fertilizer as plants in high light. Fertilize plants in high light according to package recommendations; in medium light, cut the rate in half. In low light, once or twice a year in spring or summer is enough. When plants are not growing well, usually the last thing they need is fertilizer. It is important to determine why the plant is unhealthy before deciding to fertilize.

27. **Containers.** Anything that will hold the growing medium will work. It’s better to use cell-packs or pots from last year's annuals, yogurt cups or other found containers. But you must clean them and sterilize them in a solution of 1 part bleach to 9 parts water. Make sure they have good drainage holes so excess water can drain away. And get a shallow waterproof tray that will hold them.

   a. There's no point in using containers more than 75mm to 100mm across, since you will be transplanting the young plants to the garden (or container garden).

   b. Another alternative is pots that break down in the soil. You can plant them right in the garden and avoid disturbing the young plant's roots. Some are shaped from compressed peat or coir, or you can make your own from newspaper. Don't confuse these with biodegradable resin pots; those will break down in a landfill or, eventually, in a compost heap, but you can't plant them in the garden.

   c. Seed-starting kits are readily available and can be a big help. They usually include an attached set of good-sized containers, a tray to set them on and a clear lid to hold in humidity during the early stages.

28. Large-scale gardeners often do a two-step: They closely sow seeds in a shallow tray until they sprout, or "germinate." Then they gently prick the small sprouts out and
transplant them to larger containers. This saves germination space if you are starting seeds in large numbers, but it isn't necessary. A beginner starting a modest number of seeds can germinate them right in the containers in which they will grow to transplant size.

29. **Light.** Seedlings need lots of light or they will be stalky, spindly and feeble. A very sunny, south-facing window may do for a handful of plants if you are not too far north. But most gardeners use artificial lights so they can raise more plants and make sure they get enough rays.

   a. It’s better to buy specially-made plant light setups for anywhere, depending on complexity and capacity. But many gardeners do just fine with inexpensive T-12 or T-8 fluorescent shop lights from the home improvement store.

   b. To provide a wider spectrum of light, use one cool-white tube and one red-light tube in a two-tube fixture. Newer-fangled T-5 tubes deliver more luminance from a single tube but are more expensive and require a special fixture.

   c. The crucial thing is to rig the light fixture so you can raise it. You must keep the lights just 3 to 4 inches above the plants as they grow. That's why incandescent light bulbs won't work; if they are close enough to give a plant a useful amount of light, their heat will destroy it. Fluorescent bulbs give more light but stay cool.

30. A lamp timer will take over the chore of turning the lights on and off so the plants get 16 to 18 hours of light every day and a good rest at night.

31. **Warmth.** Seed-starting happens in two stages: germination and growing. Germination is the sprouting stage, when the embryo of the plant emerges from the seed. You won't need light at this stage, but you will need gentle warmth (not harsh heat). Provide it by setting the containers on top of a refrigerator or dryer; by propping them a few inches above (not on) a radiator; or by using special heating mats sold for the purpose.
32. Once green sprouts are seen about half an inch tall, it’s better to move your plants under the lights in a cooler environment—about comfortable room temperature, between 60 and 70 degrees. A cold garage won’t do; neither will a broiling furnace room.

33. **Water.** Plants consist mostly of water and they need it for the photosynthesis that gives them energy to grow.

34. Sowing the seeds in moistened mix. Cover the containers to hold in humidity while the seeds germinate—with the cover from your kit, or with a loosely fastened plastic bag. Once they sprout, uncover the containers and water them from the bottom, by pouring water into the tray. Never water the seed-starting mix from the top; that courts disease (especially a fungus disease called "damping off") and may dislodge or damage the sprouts. Make sure air circulates freely so humidity isn't trapped around plants.

35. So-called "self-watering" seed-starting kits are helpful in keeping the water supply steady. In these arrangements, the containers sit on a fiber mat that wicks just enough moisture from a reservoir. These kits aren't magic, though; you still have to keep that reservoir filled with water.

36. **Attention.** This is the secret ingredient to successful seed-starting. It’s better to check daily: To see if the seeds have sprouted; to remove the cover when it's time and move the sprouts under lights; to make sure they stay properly moist; to keep a self-watering reservoir full; to raise the lights so they stay just the right distance above the plants; and to make sure the lights and timer haven't malfunctioned. If you are starting a few seeds on the windowsill, turn the plants every day so they don't bend toward the light.

37. As per the plan of seed starting, factor in your convenience and habits. It might be wiser to start seeds in the guest room or kitchen where they will be handier, even if you have space for fewer seedlings.

38. As your seedlings grow, watch the weather. Although a few crops can go outside earlier (read the seed packet), most should stay indoors until after the last frost date for your area has passed and your soil has warmed. If your area is having a cold spring, hold off.
39. **Moisture:** Generally the best watering practice is to water thoroughly until all the soil is evenly moist and some water runs out through the drain holes. Remove any water left in the saucer. Let the plant get moderately dry between every watering. (No plant, including cactus, can tolerate staying dry for any length of time.)

   a. When a plant gets too dry, it is critical that the entire soil mass gets moist again. To saturate dry soil, run a lot of water through the pot, or let the plant sit in water until it cannot soak up anymore and then discard the rest.

   b. A simple test for moisture is to pinch some soil (from as deep in the pot as you can get) between your forefinger and thumb, then let go. If the soil sticks together and clings to your finger, there is enough moisture for the plant at that time.

   c. If the soil is gray in color and crumbles, it is time to water again. The problem of overwatering is not in how much water is used, rather it is how often the plant is watered. Always water thoroughly and then let it get moderately dry (not bone dry) between every watering.

   d. Frequency of watering depends on day length, quality of light, and temperature of the room. Plants use less water during shorter days and cooler temperatures and therefore will not need as frequent watering.

40. Much of the scenic beauty of nature has been replaced by densely populated areas that sprawl for miles from urban centers. This visual pollution affects us all and leaves us with a longing for a closer connection with nature. We spend about 90 percent of our time indoors. Interior plants are an ideal way to create attractive and restful settings while enhancing our sense of wellbeing. In addition, houseplants can be a satisfying hobby and can help purify the air in our homes. Indoor plants not only convert carbon dioxide to oxygen, but they also trap and absorb many pollutants. Many of these chemical compounds, which are released into our air through a process called “off-gassing,” come from everyday items present in our homes and offices.

41. Temperature is the second most important factor influencing plant growth in interior environments. People feel comfortable in the range of 72 degrees F-82 degrees F, and interior plants can tolerate and grow well in the 58 degrees F-86 degrees F range because most indoor plants originate from tropical and subtropical areas of the world.

42. Temperature and light are linked through the processes of photosynthesis and respiration. These processes can be thought of as the “yin and yang” of plant life —
two parts of a circle. Photosynthesis builds sugars and starch, which are then broken down by respiration to provide energy for the development of new tissues (growth) and the maintenance of existing ones. High temperature speeds up respiration. If the plant is not producing sufficient sugars (as under low light), then high temperatures may break down what little sugars are made, leaving little to none for growth. Maintenance takes precedence over growth; therefore, under insufficient light, plants do not grow. If light is so low that sugars produced are insufficient for maintenance, the plant eventually dies.

43. **Growing Mix for Flowering Plants**: The following potting mix will grow acceptable flowering plants in most homes for most gardeners:

   a. 1 part garden loam or potting soil
   b. 1 part sand or perlite or vermiculite
   c. 1 part peat moss
   d. Add 2 to 3 ounces of 20 percent superphosphate and ¾ ounce of either bonemeal or dolomitic limestone (by weight) to 4 gallons of potting mix. After sterilizing the soil (see “How to Sterilize Soil”), add 3 tablespoons of a 6-6-6 or similarly balanced fertilizer to every 4 gallons (½ bushel) of mix. Add a minor element formulation according to the manufacturer’s recommendations.

44. **Growing Mixes for the Foliage plants**: Although most foliage plants will grow satisfactorily in the growing mix recommended for flowering house plants, they will grow better if the mix contains a higher percentage of organic matter.

   a. 1 part garden loam or potting soil
   b. 1 part sand or 2 parts peat moss.
   c. Add 2 to 3 ounces (dry weight) of dolomitic limestone to 4 gallons (½ bushel) of mix. For fluoride-sensitive plants, adjust the pH so it is no lower than pH 6.5. Superphosphate contains enough fluoride to cause foliar burn on sensitive plants. After sterilizing the soil, add 3 tablespoons of a 6-6-6 or another fertilizer such as 5-10-5 to each ½ bushel. Plastic-coated fertilizers also can be used; most of them require about 2 ounces per ½ bushel. Add a minor element formulation to the potting mix per the manufacturer’s recommendation.

45. **Growing Mixes for Orchids**: Orchids have a great deal in common with bromeliads because they also grow on trees as epiphytes and on the ground as terrestrials. A mix for orchids should have excellent drainage and aeration, too. Some soil mixes that can be used are:
a. 3 parts Osmund tree fern fiber (moisten before use by soaking in water for 12 hours)
b. 1 part redwood bark, (OR)
c. 5 parts fir bark
d. 1 part perlite
e. Tree fern slabs may also be used to grow epiphytic orchids. Add 1 ounce (dry weight) of dolomitic limestone per 4 gallons (½ bushel) of soil mix. Do not add fertilizer to the mix. After the plants are potted, add ¼ ounce of liquid 10-10-10 with minor elements per gallon of water and fertilize once every 6 weeks (if the plants are growing in Osmund fern fibers). If plants are growing in fir bark, use a liquid 30-10-10 with minor elements every 6 weeks instead of a 10-10-10 fertilizer.

46. Growing Mixes for Ferns: Ferns grow well in most recommended mixes that have a high proportion of organic matter with good soil aeration and drainage characteristics. Use any of the suggested foliage plant mixes. However, most ferns kept indoors grow better in the following mix:
   a. 1 part garden loam or potting soil
   b. 1 part peat moss
   c. 1 part pine bark
   d. 1 part coarse sand
   e. Add 2 ounces (dry weight) of dolomitic limestone to each ½ bushel (4 gallons) of soil mix and ½ ounce of either bone meal or 20 percent superphosphate. After pasteurizing the soil mix, add minor elements to the mix. Add 1 tablespoon of a 6-6-6 or similarly balanced fertilizer to each ½ bushel of soil mix.

47. **Plants also need darkness to survive.** This is how they have evolved.... Give them at least a couple hours of darkness every night if possible. If you aren't using a room at night, turn the lights off to give the plants some darkness. This is better for the environment anyway. 12-hours light, 12 hours darkness, is a good rule of thumb to follow. One does not have to follow this exactly. Plants tend to flower and produce fruit when a certain day length is met, and held constant for a period of time. Each plant will be different. Look up how day length and flowering for your particular plant to see what I mean. Leaves that develop under any particular lighting condition will contain a particular amount of chlorophyll that will be most beneficial in that light intensity. If a plant is moved from a low-light situation to a high light situation, the leaves that
developed under low light will soon become burned, and or bleached out. On the other hand, if the plant is moved into a darker area, any dark green leaves that developed under high light intensities will be sacrificed by the plant, only to be replaced by leaves better suited for the plants new environment.

48. Sterilization reduces the number of diseased organisms and weeds present in the soil. First, mix the soil with an equal portion of vermiculite or peat moss (otherwise, the soil will become very hard). Next, moisten the mixture and place it in the oven. Allow it to “bake” at 180 degrees F–200 degrees F for 1 hour. Once the soil cools, it is ready to use. To treat soil in the microwave, first mix the portion with an equal amount of vermiculite or peat moss and moisten. Place the mixture in a plastic bag. Next, consult the manufacturer’s manual to determine the amount of time and power level needed to heat the quantity of soil to about 180 degrees F (most portions of soil will generally require about 10 to 15 minutes). Insert a probe into the soil and make sure it has heated to 180 degrees F–200 degrees F, and allow the soil to cool before using it or storing it for future use.

49. Acclimatization is the adaptation of a plant to a new environment, and it is very important for the health and growth of indoor plants. In greenhouses, plants are accustomed to high light, nutrition, water supply, temperatures, and relative humidity — conditions ideal for fast growth.

   a. Residential homes, with low-light interiors and low relative humidity, will most likely produce a stressful experience for plants — the greater the difference between the previous environment and the environment of the house, the greater the stress the plant endures.

   b. Acclimatization is generally done in the greenhouse or the nursery. Plants are grown for a period of time under low-light levels and with fewer nutrients. Because this slows down plant growth, acclimatized plants are not ready for the market as early as no acclimatized plants.

50. Summary of Interior Landscaping Recommendations:

   a. Light:
      
      i. Sunny light areas: At least 4 hours of direct sun
      ii. High-light areas: Over 2150 lux, but not direct sun
      iii. Medium-light areas: 800 to 2150 lux
      iv. Low-light areas: 250 to 800 lux

   b. Temperature:
i. Cool: 50°F night, 65°F day temperatures
ii. Average: 65°F night, 75°F day temperatures
iii. Warm: 70°F night, 85°F day temperatures

c. Relative Humidity:
   i. High: 50% or higher
   ii. Average: 25% to 49%
   iii. Low: 5% to 24%

d. Watering:
   i. Keep soil mix moist
   ii. Surface of soil mix should dry before re-watering
   iii. Soil mix can become moderately dry before re-watering

e. Suggested Soil Mix:
   i. For specific ingredients, refer to the various growing mixes in “Soil/Growing Medium.” The soil mixes are keyed as follows:
      ii. Flowering house plants
      iii. Foliage plants
      iv. Bromeliads
      v. Orchids
      vi. Succulents and cacti
      vii. Ferns
5.4 Constraints and Limitations in Landscape Design for Hospitals

The above recommendations are guidelines are prescribed with the following constraints and limitations:

1. These guidelines are outlined only for the hospital premises, especially in Chennai.
2. However, these recommendations may be followed and applicable for the regions which are coming under Tropical zones as Chennai.
3. The ratios obtained in this research is just one of the ratios in one of the required amalgamations. The ratios may be obtained in so many mixtures of the other components of the hospital premises. Hence, this research is a dynamic critique. Therefore, the above mentioned recommendations may have changes in the premises which have other ratios / other combinations.
4. These guidelines which are applicable for both internal and external landscaping, is purely framed for hospital premises. It may or may not be suitable for the other premises or campuses.
5. As the hypothesis is framed, these guidelines are framed only for the tropical area and the landscape of that area, not for the other zones.
6. The recommendations are clearly made for the patients and their environment.
7. The recommended trees and plants are selected on the basis of the medicinal aid to the patients and the other users within the hospital premises.
8. The guidelines are made for the planting methods of the species which are medicinal aided plants and which differ in the way of maintenance comparing to other plants.
9. However, this research is applicable only for the premises which obtain the resultant ratio and therefore, the above recommendations and guidelines fit only to those hospitals which would obtain the ratios.
10. The number of trees, plants, shrubs, herbs, climbers and ground covers depends on the requirement of the relevant hospital premises and depends on various other parameters such as the site location, the number of population, soil condition, etc.
11. Method of plantation for exterior and interior landscaping must be followed as prescribed in this chapter for the hospital premises.