ARULMIGU PALANI ANDAVAR ARTS COLLEGE FOR WOMEN, PALANI

PG DEPARTMENT OF BOTANY

LEARNING RESOURCES

HORTICULTURE AND LANDSCAPING

HORTICULTURE AND LANDSCAPING

Horticulture - scope and divisions

Introduction to Horticulture:

Horticulture is based on agriculture, and its name comes from the Latin terms Hortus and culture, which mean "garden" and "cultivation," respectively.

Horticulture does not involve large-scale crop production or animal husbandry, unlike agriculture.

Horticulture does not involve large-scale crop production or animal husbandry, unlike agriculture. Horticulture, on the other hand, emphasizes the use of small plots with a diverse mix of mixed crops, while agriculture focuses on a single large primary crop at a time.

Horticulture has been studied and practiced for thousands of years, and it is thought to have played a role in the transition from nomadic human cultures to sedentary, or semi-sedentary, horticultural communities.

Horticulture is classified into many types, each of which focuses on the production and processing of various plants and foods for particular purposes.

Multiple organizations around the world teach, encourage, and support the advancement of horticulture in order to preserve science.

Plant propagation and cultivation are used in horticulture to increase plant growth, yields, quality, nutritional value, and resistance to insects, diseases, and environmental stresses.

Luca Ghini, Luther Burbank, and Tony Avent are well-known horticulturists.

Horticultural science is the only plant science that includes both plant science and plant aesthetics. It is the science and art of growing, developing, and commercializing edible fruits, vegetables, flowers, herbs, and ornamental plants. Horticulture is an applied science, meaning that the knowledge gained by horticulturists is used to improve plant production, marketing, and the quality of human and animal life on Earth. Horticulture has a regular effect on our lives by supplying healthy fruits and vegetables, providing visual pleasure, and encouraging leisure activities.

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BOTANICAL GARDENS OF INDIA

Introduction:

Indian Botanic Garden, in full Acharya Jagadish Chandra Bose Indian Botanic Garden, formerly Royal Botanic Garden, botanical garden in Haora (Howrah), West Bengal, India, famous for its enormous collections of orchids, bamboos, palms, and plants of the screw pine genus (Pandanus). In 2009 it was renamed to honour Indian plant physiologist and physicist Sir Jagadish Chandra Bose. It is operated by the Botanical Survey of India.

Situated on the west bank of the Hugli (Hooghly) River, opposite Kolkata (Calcutta), the garden covers more than 270 acres (109 hectares), on which about 1,700 plant species are cultivated. It was founded in 1787 by the East India Company, primarily for the purpose of acclimatizing new plants of commercial value and growing spices for trade. A major change in policy, however, was introduced by the botanist William Roxburgh after he became superintendent of the garden in 1793. Roxburgh brought in plants from all over India and developed an extensive herbarium. This collection of dried plant specimens eventually became the Central National Herbarium of the Botanical Survey of India, which comprises 2.5 million items. Over the years attractive display gardens for the public have been developed and many kinds of plants have been cultivated for scientific observation. During the 1970s the garden initiated a program to introduce improved food plants and other varieties of economic benefit to the people of India. The best-known landmark of the garden is an enormous banyan tree that is more than 1,000 feet (300 metres) in circumference and thought to be some 250 years old.

TOP 9 BOTANICAL GARDENS IN INDIA

1. The Acharya Jagadish Chandra Bose Indian Botanic Garden in Kolkata

The Acharya Jagadish Chandra Bose Indian Botanic Garden is located very close to Kolkata, in Howrah Shibpur. It is one of the largest and oldest botanical gardens in South Asia, consisting of 273 acres. This garden was founded in 1787 by Robert Kyd, an officer of the British East India Company. It was then known as the company garden, later changed to Acharya Jagadish Chandra Bose Indian Botanic Garden in 1875.

The botanical garden is home to more than 12,000 rare and endangered plants, including trees, climbers, herbs and shrubs. However, the most interesting and outstanding attraction is the 250-year-old great banyan tree, covering 3.7 acres. Even after being partially damaged by two cyclones in the nineteenth century, the banyan tree is still standing tall. It also has managed to include its name in the Guinness Book of world records. It has also formed the world's second most extensive canopy.

Apart from the banyan tree, the botanical garden in Kolkata is divided into different sections including glasshouses, greenhouses, cactus houses etc. There is an artificial lake as well for boating. If you want to explore the garden, make sure to choose the winter months. Check out the best Kolkata tour package on Thomas Cook.

2. Government Botanical Garden in Ooty

The Government Botanical Garden in Ooty is one of the most popular tourist attractions in Tamil Nadu. It was established way back in 1848 as a public garden and later handed over to the Government for public access. Located in Udhagamandalam, the botanical garden covers an area of 22 hectares and is divided into five different sections. There are Lower Garden, New Garden, Italian Garden, the Conservatory, and the Nurseries.

The Italian Garden has an outstanding display of colorful flowers, flowerbeds, and fountains. It was originally created by Italian prisoners after the end of World War 1. The other sections of the garden include an outstanding collection of plants, trees, and flowers. It houses a variety of flowers, orchids, bonsai, medicinal plants, ferns and trees like Pine, Oak, Eucalyptus etc. The garden is also famous for hosting a flower festival in May. During the festival, the garden is decorated with vibrant flowers. This flower show attracts a lot of flower enthusiasts from all over the country.

If you decide to visit the garden, you will have a delightful experience for sure. Make sure to check it out while in town, as the garden is just 2 km from downtown Ooty. Check out the best Tamil Nadu tour packages on Thomas Cook.

3. Lalbagh Botanical Garden in Bangalore

Lalbagh Botanical Garden is located in downtown Bangalore, covering an area of 240 acres. It is one of the most popular attractions in the city as well. Commissioned by Haidar Ali, the ruler of Mysore, the construction of the garden was started and then finished by Tipu Sultan. Home to more than 1,850 species of rare and exotic plants, including Afghani, Persian and French origin ones.

One of the key attractions within the garden is the Glass House which hosts famous flower shows twice a year. During the republic day and Independence Day celebrations, many visitors come to witness the stunning display of flowers. Another interesting feature is the massive rock formation, which could be as old as 3,000 million years. You can stand here to enjoy a panoramic view of the entire garden.

This garden also includes other attractions like a lake, a Pigeon House, Floral Clock, Lecture Hall, Deer Paddock and many more. Through guided tours, you can learn more about the different plant species and the history of this place. The garden is open to the public all year and hosts cultural events more often.

4. Lloyd's Botanical Garden in Darjeeling

Lloyd's Botanical Garden in Darjeeling is a famous place to visit in the picturesque hill station in West Bengal. Founded in 1878, the garden is named after William Lloyd, a renowned botanist. The garden serves as a centre for the conservation and research of different plant species. It also aims to promote the native flora of the Darjeeling Himalayan hill region. Situated around 1,800 m above sea level, the garden includes a massive collection of Himalayan plants.

Visiting Lloyd's Botanical Garden provides you with an opportunity to get in touch with the natural beauty of the Eastern Himalayas. Covering an area of 40 acres, the garden is home to more than 150 species of cactus. Apart from that, it also features numerous varieties of trees organised in well-maintained sections. There is a rock garden that includes creative rock formations among different plants and flowers.

This botanical garden is very close to downtown Darjeeling. You can reach the garden by taking a short taxi ride from the town centre. It is a perfect place to watch the surrounding areas as well.

5. Assam State Zoo Cum Botanical Garden in Guwahati

Commonly known as Guwahati Zoo, Assam State Zoo Cum Botanical Garden is situated in the Hengrabari Forest region. Founded in 1958, the Assam State Zoo covers an area of around 830 acres containing diverse animals and plants. The zoo section includes mammals, reptiles, and birds while the garden contains a variety of rare and endangered plants. More than 900 animals are here with 113 animal species. The zoo has transformed into a bigger abode for animals in recent years.

The botanical garden section has outstanding landscapes, themed sections and a rich collection of flowers. It is also a research and conservation centre for plants, contributing to their preservation. It plays a crucial role in wildlife reservations as well by participating actively in rescuing animals and

promoting public awareness. Visiting the zoo cum garden would be a perfect opportunity for you to witness and appreciate the rich wildlife and plant species.

Since this place is situated in the middle of the city of Guwahati, you can easily access it anytime you want. This place is just 25 km away from downtown Guwahati.

6. Jawaharlal Nehru Memorial Botanical Garden in Srinagar

Jawaharlal Nehru Memorial Botanical Garden is located on the foothills of the Zabarwan Range. Founded in 1969, the garden covers an area of around 80 hectares. It is dedicated to India's very first prime minister, Jawaharlal Nehru. The garden includes four major sections — Research Centre, Plant Introduction Section, Recreational Centre, and Botanical Garden.

The garden is known for its outstanding landscapes, diverse plant species, and peaceful atmosphere. The lake, the greenhouse, rock gardens and themed gardens are mandatory to explore while you are here. The lake that occupies 17 hectares of the entire garden area is perfect for paddle boating as well. Over 300 species of rare flowers are here to decorate the garden with a variety of colors.

You can take a lot of pictures in this garden since the place practically overlooks Dal Lake. It also offers a pleasant environment where you can take a stroll or can have a picnic if you want.

7. National Botanical Research Institute in Lucknow

National Botanical Research Institute is among the largest botanical gardens in India. Established in 1978, it is spread across 25 hectares including a massive library, two laboratories and a herbarium. In this research institute, flower exhibitions are held two times a year in January and November. Here you will not only get a chance to witness the flowers, but you can also buy some saplings and seeds. The plant collection of this botanical garden is truly tremendous, making it one of the most visited places in Lucknow.

Also known as Sikandar Bag, the garden was originally planned by emperor Nawab Saadat Ali Khan. The most interesting part of this place is the dry flower arrangements which are rare when it comes to any botanical gardens in India. Apart from that, the garden is home to some outstanding lawns, a cactus house, a conservatory, lily pools and not to mention multiple rose gardens.

8. Empress Garden in Pune

Empress Garden, located in Pune, is a beautiful and surreal botanical garden that is no less than paradise. Previously known as the ‘Soldier’s Garden,’ the garden is now spread across 39 acres. It is a perfect place for nature lovers, and families seeking a peaceful getaway from daily life

First, it was designed as a private garden for British officials and later opened to the public. From Queen Victoria, the garden got its name which was then known as the Empress of India. When it comes to the garden, it has a diverse collection of exotic plants. Home to rare plant species such as Baobabs, Gulmohar, and Jacaranda, the garden is an ideal place to wander through the flower beds and well-maintained landscapes.

The garden includes a rose garden where you can admire different varieties of roses during the flowering season. Additionally, the garden has a small nursery where you can buy plants and gardening tools as well. Overall, this place offers you a tranquil atmosphere and provides you with a perfect opportunity to relax amidst nature.

9. TNAU Botanical Garden in Coimbatore

Tamil Nadu Agricultural University Botanical Garden is a renowned garden that is an important educational hub. It is one of the largest botanical gardens in the country, spanning over 300 acres. Founded in 1925, the TNAU botanical garden is affiliated with the Tamil Nadu Agricultural University. It aims to promote awareness about plant conservation among students and the public.

The garden is home to an impressive collection of rare and endangered plant species, medicinal plants, and fruit trees. You can explore the different sections with well-maintained pathways. For every botanist enthusiast, it is a perfect opportunity to have a visual delight and gain some knowledge. A flower exhibition is held here each year in January.

The garden includes a wide range of plant species that serve as a living laboratory for students, researchers, and anyone who wants to learn. The different sections have a bamboo garden, a palm garden, a rock garden, a cactus house and plenty more. As a visitor, you can take a relaxing walk among the luxurious greenery or learn about different plants. The beauty of this botanical garden is truly one of the best in the country.

Conclusion:

Indian Botanical Gardens are almost like living museums. You can witness the wonderful nature with your own eyes and learn more about them by taking guided tours. They are not only home to the world's rarest plants and flowers but also an opportunity for you to raise awareness about preserving the environment. In case you have never visited a botanical garden before, now is your chance to change that.

If you want to visit any places in India, don't forget to get help from Thomas Cook. Thomas Cook has the best of India tour packages that need to be checked out with the life.

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ORCHARD CULTIVATION

LAYOUT

The layout of the orchard is a very important operation. Under this, the arrangement of fruit plants in the plot is carefully done to put the plants at a suitable distance for proper development and for accommodating the requisite number of plants per unit area in addition to improving the aesthetic look of the orchard. Hence, the factors which are considered important for proper layout of the orchard are system of planting distance of individual fruit species which again would provide the following advantages:

Allow equidistance for each tree for uniform growth.

Allow easy orchard operations like cultivation, intercropping, irrigation, spraying of plant protection chemicals and growth regulators, harvesting etc.

Proper utilization of orchard space avoiding wastage of land.

Help in proper supervision and management of the orchard.

Aloe further extension of area from time to time so that subsequent planting would match with the existing orchard planting.

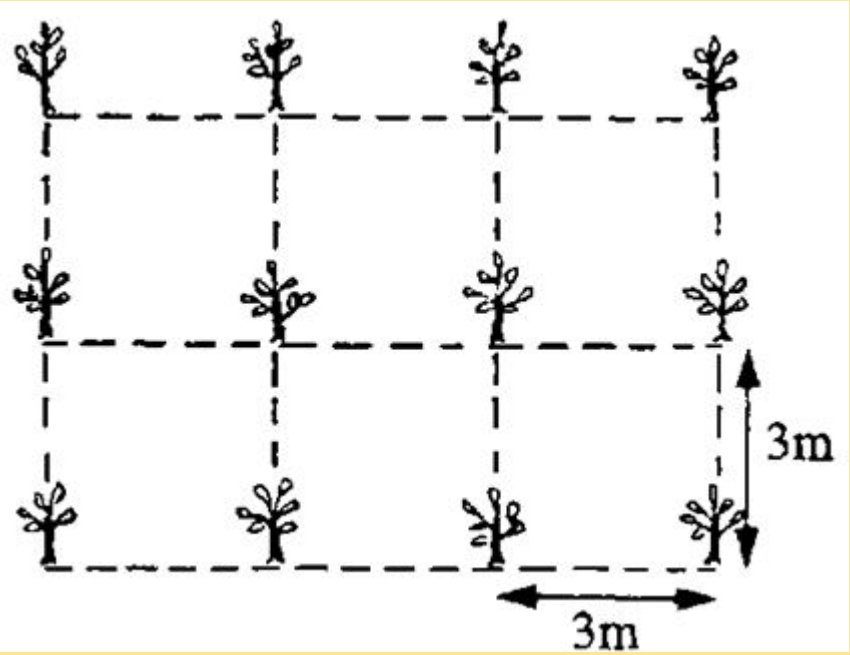
36.2 SYSTEM OF PLANTING

The system of planting to be adopted is selected after considering the slope of land, purpose of utilizing the orchard space, convenience etc. Generally, six systems of planting are recommended for fruit trees.

36.2.1 Square system

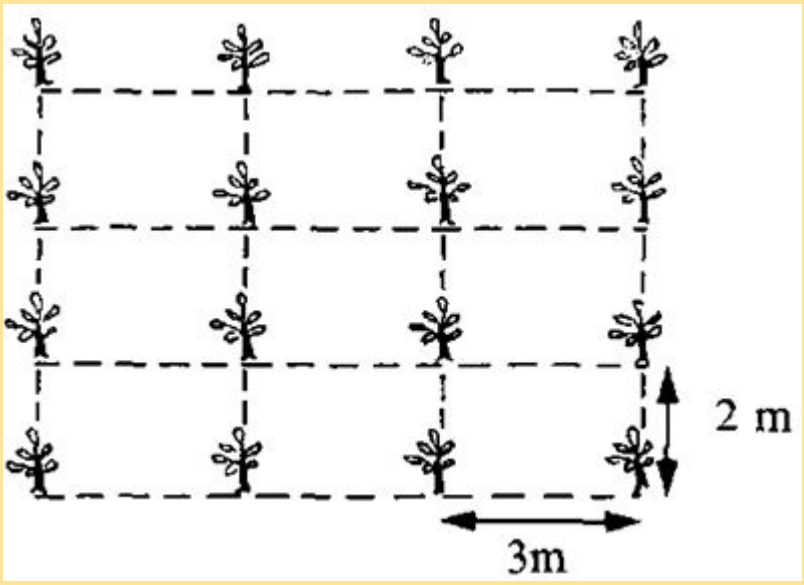
This system is considered to be the simplest of all the system and is adopted widely. In this system, the plot is divided into squares and trees are planted at the four corners of the square, in straight rows running at right angles. While laying out the plot a base line is first drawn parallel to the road, fence or adjacent orchard, at a distance equal to half the spacing to be given between the trees. Pegs are fixed on this line at the desired distances. At both ends of the base line right angles are drawn by following the simple carpenter’s 3, 4, 5 meters system. After the formation of three lines it is easy to fix all the other pegs to mark the tree locations in between the lines at the required spacing by using ropes connecting the pegs of the lines in opposite directions.

Under this system, intercultural operations, spraying, harvesting etc., can be done conveniently and easily. Planting of quick growing fruit trees like papaya, banana, guava during the early life of the orchard is possible. Rising of inter-crops like vegetables, ginger, turmeric, cumin, coriander and such other spices can be done conveniently cultivation and irrigation can be done in two directions.



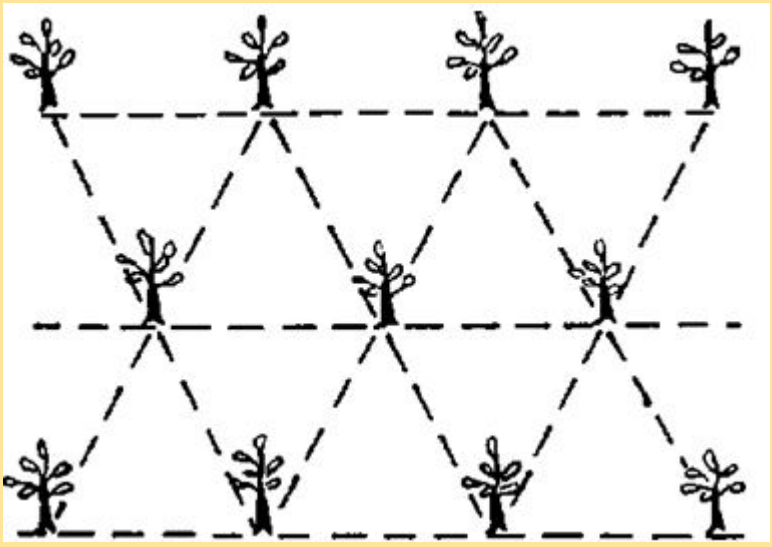
36.2.2 Rectangular system

In this system, the plot is divided into rectangles instead of squares and trees are planted at the four corners of the rectangle in straight rows running at right angles. The same advantages which have been mentioned in the square system are also enjoyed here. The only difference is that in this system more plants can be accommodated in the row keeping more space between the rows.



36.2.3 Triangular system

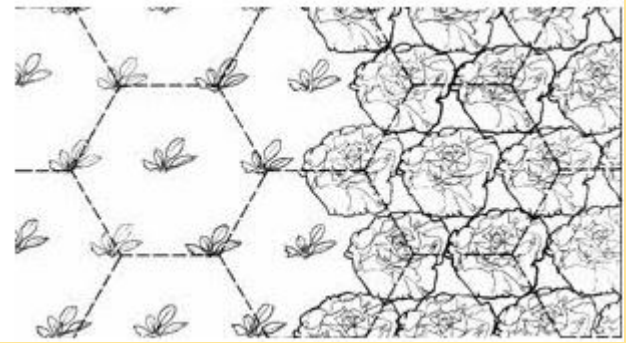
In this system, trees are planted as in the square system but the plants in the 2nd , 4th, 6th and such other alternate rows are planted midway between the 1st, 3rd, 5th and such other alternate rows. This system has no special advantage over the square system except providing more open space for the trees and for intercrops. It is not only a difficult layout but cultivation also in the plots under this system becomes difficult.



36.2.4 Hexagonal system

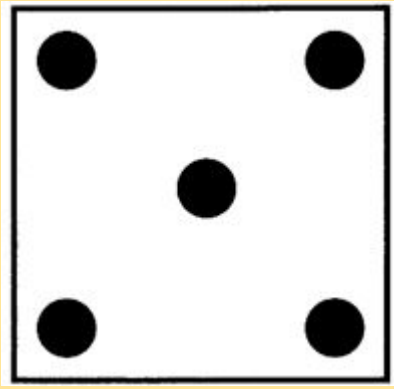
In this system, the trees are planted at the corners of an equilateral triangle and thus, six trees from a hexagon with the seventh tree at the centre. This system is generally followed where the land is costly and very fertile with ample provision of irrigation water. Though 15 per cent more trees can be planted in a unit area by this method over the square system, fruit growers usually do not adopt it, as it is difficult to layout and cultivation in the plot cannot be done so easily as in the square system.

For laying out the plot, a base line is drawn in one side as in the square system. Then an equilateral triangle having rings at each corner and with sides equal to the length of the required distance is made of heavy wire or chain. Two of these rings are then placed on the stakes of the base line and the position of the third ring indicates the position of a tree in the second row. This row is then used as the base line and pegs are set in the third row. In this way entire plot is laid out.



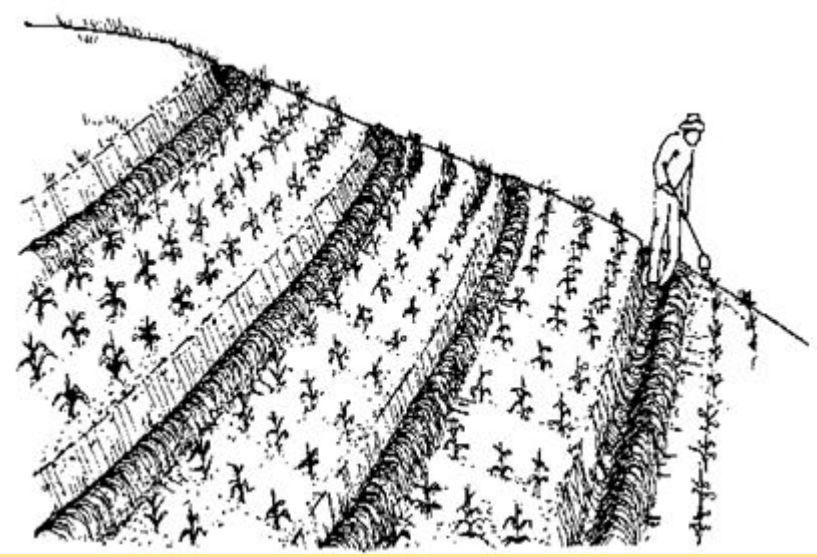
36.2.5 Quincunx system

This system of planting fruit trees is similar to square system, except that a fifth tree is planted at the centre of each square. As a result the tree number in an unit area becomes almost double the number in the square system. The additional tree in the centre is known as “filler”. The fillers are usually quick growing, early maturing and erect type fruit trees like banana, papaya, pomegranate, etc., which are removed as soon as the main fruit trees planted at the corner of the square come into bearing. The planting of filler trees provides an additional income to the grower in the early life of the orchard.



36.2.6 Contour system

It is generally followed on the hills with high slopes. It particularly suits to a land with undulated topography, where there is greater danger of erosion and irrigation of the orchard is difficult. The main purpose of this system is to minimize land erosion and to conserve soil moisture so as to make the slope fit for growing fruits. So, the contour line is designed and graded in such a way that the flow of water in the irrigation channel becomes slow and thus finds time to penetrate into the soil without causing erosion.



36.3 Spacing of Fruit Trees

Provision of optimum spacing to fruit trees is one of the most important aspects of successful fruit culture. If the spacing is inadequate, the fruit trees will grow poorly, produce small quantity of fruits of inferior quality, and suffer from various diseases and insect pests. The cultural practices of the orchards are also greatly hindered. Weeds and grasses grow in abundance and rob off the vitality of the trees, resulting in their early decline and premature death. On the other hand, if the spacing is too wide, there will be wastage of valuable orchard land without having any direct benefit on the ultimate yield of the orchard. The optimum spacing is therefore, desired so that the fruit trees may grow and bear crops properly. The optimum spacing is one in which the tree on attaining its full size will not touch the branches of the neighbouring ones and the root-system of one tree must not encroach that of the adjoining tree. The spacing given to fruit trees is generally governed by the following factors:

Climate and soil

Varieties

Growth habit

Rootstocks

Nature of irrigation

Pruning

It is very difficult to suggest the exact spacing for fruit trees which will suit every locality or soil. However, the spacing given below for some of the important fruits may be considered as a safe guide for planting fruit orchards both in the hills and plains.

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PRUNING AND TRAINING

INTRODUCTION:

Some of cultivated fruit trees grow wild and do not give sufficient yield unless pruned or trained to a specific form. All types of fruit tree do not require pruning e.g. mango, chiku, etc and some fruit trees can grow well naturally e.g. pineapple, papaya they do not require pruning. While most deciduous tree like apple, pear, almond etc and grapes, ber, fig citrus, pomegranate, guava etc require pruning to train them for desired shape.

41.2 PRUNING

Pruning may be defined as the art and science of cutting away of portion of plant to improve its shape, to influence its growth, flowering and fruitfulness and to improve the quality of the product. It is done to divert a part of plant energy from one part to another part of plant.

Objects of Pruning:

Training of young trees

Maintenance of grown up trees i.e. to maintain the health of bearing plant

Bringing vigour in old trees

Effect of Pruning:

It increases new vegetative growth

In young trees flowering will be delayed

In old trees there will be new vigorous vegetative growth which bears fruit

It reduces bearing surface are as a result tree remain dwarf which is compensated by accommodating more number of dwarf trees (because pruning is a dwarfing process)

Improvement in size, color and quality of fruits.

Principles of Pruning:

Young trees are pruned to train it to acquire a desired shape.

In old trees light heading back is done to stimulate the flowering

In bearing trees light pruning is done to stimulate fresh growth. it bearing flower buds on fresh growth

In old trees heavy pruning is done to restore vigorous

All the diseased, weak, dead or shading branches must be removed.

Systems of Pruning

Heading back: Only tops of branches are headed back or cut off (light pruning).

Thinning out: Complete removal of a branches or a part

Dehorning: Cutting away the main limbs or thick major branches

Bulk pruning: Heavy pruning all over the tree. For good fruit production only judicious heading back or thinning out should be done.

Rules of Pruning

Never leave a stub as far as possible

Minimum cut surface

Start cutting from the lower end first, leave half way or even less and then cut from the top

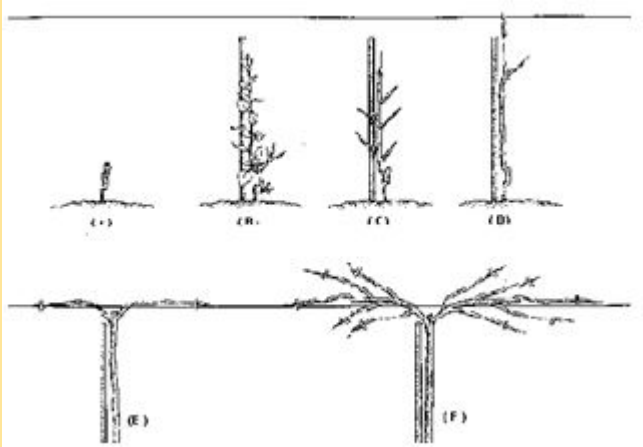
Keep the cut surface clean and smooth

Protect the wound with Bordeaux paste.

TRAINING

INTRODUCTION:

It means developing a desired shape of the tree with particular objectives by controlling habit of growth. Training is start from nursery stage of plant. Some fruit crops like grape vines, ber, fig, guava etc require training.



Objects of Training:

To admit more light and air to the centre of the tree to expose maximum leaf surface to the sun

To direct the growth of the tree so that various cultural operations such as spraying, ploughing, harvesting can be performed easily and at lower cost.

To protect the tree from sun burn and wind damage.

To secure a balanced distribution of fruit bearing parts of the tree.

Principles of Training:

Formation of the mainframe work must be strong. The branches must be suitable spaced apart and the tree must be balanced on all the sides.

Never allow several branches to grow at one place or very near each other.

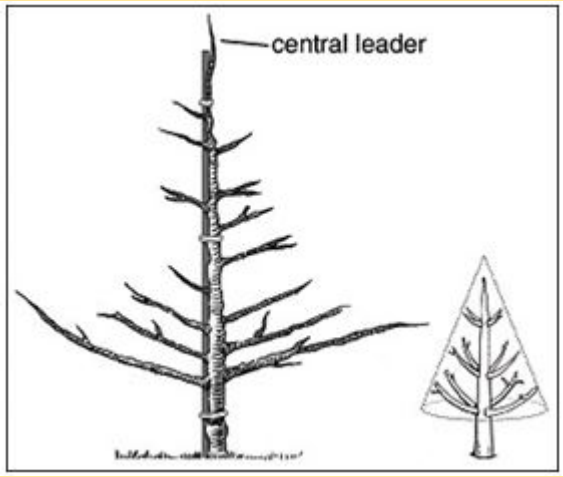
Careful training of main branches is very essential.

Another important point about training is that if two branches are growing at the same point try to train them to grow at a wider angle. Narrow angle is always weak.

System of Training:

Central leader system:

In this system the central leader branches are allowed to grow indefinitely so that it will grow more rapidly and vigorously than the side branches and tree became tall. Such a tree bears fruit more near the top. The lower branches are less vigorous and less fruitful.



Open centre or vase system:

The main stem is allowed to grow only up to a certain height about 1.5 to 1.8 m and then it cut for development of lateral branches. It allows full sunshine to reach each branch.

Delayed open centre or modified leader system:

It is intermediate between the above systems. It is developed by first training the tree to the leader type by allowing the central axil to grow un pruned for the first four or five years. Then central stem is headed back and lateral branches are allowed to grow as in the open centre system.

Bush system:

An unpruned tree multi stem and dwarf growing habit.

Over head trellis or Bower system:

When vines are trained on mandap.

Modified bower or Telephone system:

Similar to bower system except that after every two meter as space is kept to walk and carry out cultural operations.

SPECIAL HORTICULTURAL PRACTICES FOR INDUCING FRUITING

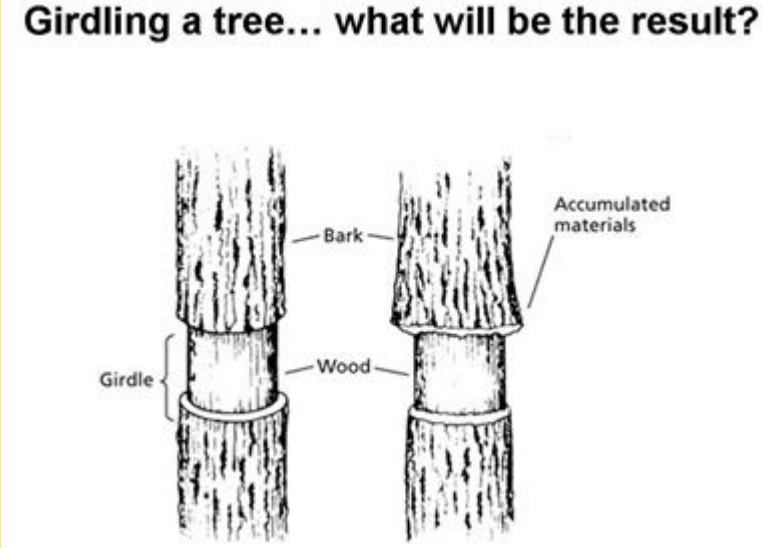
Of the many factors influencing floral initiation, carbohydrates-nitrogen ration appears to be the one factor that could be controlled. The accumulation of carbohydrates can be brought about by more rapid manufacture and less immediate utilization. In vegetative weak plants, favorable conditions for carbohydrate accumulation will have to be created by provision of desired temperature, light, water and nutrient change while in vigorous plants this change is to be induced by the reduction of water and nutrient supply. Regulation of fruiting can be effected by influencing fruit bud differentiation or by influencing fruit set and development.

Pruning, root pruning, ringing, girdling, notching, bending, smudging are some of the specialized horticultural practices followed for regulation of fruiting.

Ringing and Girdling:

Ringing consists of removing a ring of bark about 1 to 2 cm wide around the trunk or branches, while Girdling is a milder treatment to draw a knife around the branch so as to cut through the bark but not the wood. A wire tied very firmly round the stem also serves the same purpose.

Ringing or girdling will increase the concentration of carbohydrates above the wing. It will also reduce the nitrogen supply because subsequent to the stopping of food to the roots, the root growth will be stopped and hence the supply of nitrogen to the tree will slowly decrease and became limited. No more root growth, no nitrogen supplies. The result will be a wide C: N ratio and then flowering increased. Ringing is a drastic operation done when fruit trees fail set fruit. It is likely to check vegetative growth and to some extent the growth of roots. Ringing is done in vigorous mango tree.



i. Notching

It is similar to ringing except that in notching only soil slip bark about 0.2 to 0.5 cm thick and 1.5 to 2.5 cm in length is removed just above or close to a dormant bud in slantwise so that the latex does not coagulate in the bud itself. The bud selected should be large, plampy and healthy which is produced on a perfect mature wood and has undergone dormancy. Generally 3 to 4 buds in the middle portion of the selected shoot are best to operate on. Fig has responded to notching and it is practiced in fig cultivation. The season for notching the fig is August-September.

ii. Bending

Bending a branch downward, sometimes checks growth and causes accumulation of starch in the branch with greater flowering. This tends to increase carbohydrate concentration. The bending brings pressure on the bark on the translocation of photosynthesis is obstructed due to narrow passage. The bending of branches is usual as a substitute for severe pruning in shaping the young trees and more fruit is borne because more branches are left to bear and more leaves are left to synthesize food material. In case of bending the effect of apical dominance of the growing shoot is removed and auxins during translocation activate the dormant buds. This is usually practiced with local guava variety in the Maharashtra state (Deccan area).

iii. Smudging

Smudging is a practice of smoking the tree by burning brush wood on the ground and allowing smoke to pass through the centre of the crown of the tree. The smoking is discontinued as soon as the terminal buds begin to swell. Not commonly followed in India. Practice of smoking to the trees like mango,

commonly employed in the Philippines to produce off-season crop. Smoking containing ethylene gas, which is responsible for initiation of flowering.

iv. Root pruning

Root pruning results in less carbohydrate utilization of the top growth through there is a little more utilization of carbohydrate for root functions. There is an accumulation of carbohydrates due to check of top growth, which results in fruit bud differentiation. As the effect of root pruning is to check the vegetative growth. The plant became dwarf. Root pruning is a method of inducing fruitfulness or determining the time of flowering. The root pruning is done two months before the bloom required. The main roots are exposed to the sun and the fibrous roots are cut, so water is withheld. The trees are allowed to go dry until their leaves wither and fall down. The time taken for leaf fall is from 3-4 weeks. After that exposed roots are covered with a mixture of soil and manure. The trees are then immediately irrigated. First irrigation may be given with very less water. The trees burst into flowering in about 2-3 weeks. Practice very widely adopted by citrus growers in western and central India (in santra). The trees on which root pruning is practiced quite frequently are short lived and are liable to be week and unhealthy. Hence root pruning is usually restored to when other method such as ringing etc. Root pruning is generally included in bahar treatments given to fruit trees like mosambi, santra, guava, pomegranate, lime etc. It is also practiced while manuring large trees like mango, by trench method where smaller roots coming in the trench are usually cut away.

v. Bahar treatment

This practice is followed with fruit trees like mosambi, santra, grape fruit, guava, pomegranate ber, lime etc. in the state of Maharashtra, M.P. and Gujarat etc. As there is no distinct winter (very cold winter) these fruit trees are usually continuous vegetative growth resulting in indistinct flowering season. This practice is useful in encouraging flowering as well as regulating the time. About 1 to 1 ½ months prior to the expected flowering irrigation is withholding. There are three flowering season namely Mrigbahar, Hasta bahar and Ambebahar.

Mrigbahar: Flowering in June-July

Hasta bahar: Flowering in October-November

Ambebahar: flowering in December-February

The orchard is ploughed up to 20 cm depth both ways and the roots are exposed by removing the upper 10-15 cm of soil within a radius of 60-90 cm around the trunk. The dead and decayed fibrous roots are

removed in the area exposed. The leaves start turning yellow, shrivel and fall. These are the indication to know that the trees have rested long enough and accumulated food reserves. The exposed roots are then recovered with original soil and necessary manures are added. Trees are irrigated lightly. The second watering is given on the 3rd or 5th day and first two watering stimulate blossoming and if heavy irrigations are given at the beginning, this may tend to vegetative growth only. Root exposure is not necessary in case of sandy, sandy loam and other types of light soils. The choice of bahar depends upon availability of water and time of year the fruit is required in the market. Where irrigation water is available, the grower prefers Hasta or Ambebahar.

GROWTH REGULATORS

Growth retardants like CCC, (in Mango 1000 ppm.), higher concentration of Auxin, NAA (in Mango 200 ppm), Ethylene -750 ppm, Paclobutrazol -4-6 g (Cultar).

Use of Hormones as Plant Growth Regulators in Horticultural Crops

What are hormones: Hormones are internally synthesized compound in plants bodies and they markedly affect the metabolic activities inside the plant. They required in very minute quantities.

Since plants make them they are organic in nature, however, they can also be prepared synthetically and such synthetic hormones are also as effective as the organic hormones produced naturally by plants.

Effectiveness of hormones: Different hormones have regulatory effects on different activities. Further, two derivates of a compound can also have different effects.

Carriers: The medium in which the hormones are mixed is called carrier. This may be water, alcohol, oil, charcoal powder, talc or flour etc.

Spreaders: Certain plants have waxy coatings on their bodies. In such cases spreader like soap are mixed with hormones. Spreaders reduce the surface tension and even ensure spreading of the liquid applied.

Use of hormones - It is done in following activities:

i. Rooting of cutting

ii. Blossom thinning

iii. Preventing fruit drop

iv. Increasing fruit setting or development of parthenocarpic fruits

v. Germination of seeds

vi. Early maturity

vii. Weed control

i. Rooting of cutting: Various chemicals compounds are known to be useful in rooting of cutting e.g. sugars, potassium permanganate, manganese, iron, phosphate etc. carbon monoxide can also be useful in root formation but the most successful are indolebutyrie acid (IBA) and naphthalene acetic acid (NAA). Some new promising hormones are trichlorophenoxyacetic and trichlorophenoxypropionic acid.

These hormones are effective only when used in low concentrations. In high concentration they inhibit growth. Mixture of hormones is more effective than single hormone.

(a) Advantages:

Percentage of success in rooting increases

Quicker root formation

More root and heavier roots

Lesser time

(b) Limitation: Plants must have natural capacity. Hormones can only help and

proper environmental condition.

ii. Blossom thinning: Thinning of fruits is the term commonly used for reducing the number of fruits. Thinning does reduce the number of fruits but the remaining fruits become bigger and gain more weight. In excessive bearing, thinning becomes a necessity. In papaya NAA has been reported to be effective for thinning of fruits.

Naphthalene acetic acid, naphthalene acetymide sodium salts of NAA is most effective. Proper concentration and the stage of flowers are important. Only fully opened but unpollinated flowers will be killed. Any mistake in concentration might loss the entire crop.

iii. Preventing fruit drop: Abscission layer is the cause of fruit drop. This is a corky layer of cells at the base of petiole of the junction of fruit and stalk. Hormones can prevent the formation of abscission layer.

Quality of fruit is not affected. It is not harmful. Naphtaleneacetic acid and its derivatives are the best. If fruits are not picked in time they may become overripe. More work is done on use of hormones for preventing pre harvest drop in apples.

iv. Increasing fruit setting by seedless fruit production: As early as 1909 it was found that water extract of pollen grains when applied to pistil of flowers induced parthenocarpy, N.A.A. are useful. At present the use is limited to glass house crops particularly tomato.

v. Germination of seeds: Not much success has been obtained in increasing germination through hormone treatment.

vi. Controlling flowering: Ethylene and acetylene are used in Hawali and Australia for early flowering in pineapples. Application of NAA (0.006 % spray) is found to reduce maturity period by 2 months in pineapples. In tomato tridobenzoic acid changes leaf buds into flower buds.

vii. Weed control: Poisonous chemicals like arsenic, boron or petroleum compounds can kill weeds but they are dangerous to human life.

41.5.2 Synthetic Hormones: These are superior to chemical poisons.

Selective in action

Harmless to soil, harmless to man and animals

Less expensive and non corrosive

Not inflammable

Synthetic in nature and required in very low concentration

Kill the entire system

e.g. 2-4 Dichlorophenoxyacetic acid (2-4, D), 2-4-5- Trichlorophenoxyacetic acid (2-4-5, T), 2-Methyl-4 Chlorophenoxyacetic acid, Isopropyl-N-Phenylearbamate.

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IRRIGATION

Water is an essential element for survival. About seventy per cent of the human body consists of water while plants contain almost 90 per cent of water. Still, we have to depend on some outside sources to fulfil the water requirements of our body.

Similarly, crops require water for their growth and development. The process of supplying water to the crops is known as irrigation.

Irrigation

Types

Surface Irrigation

Localized Irrigation

Sprinkler Irrigation

Drip Irrigation

Centre Pivot Irrigation

Sub Irrigation

Manual Irrigation

Methods

Traditional Methods

Modern Methods

Sprinkler System

Drip System

Importance

What is Irrigation?

Irrigation is the process of applying water to the crops artificially to fulfil their water requirements. Nutrients may also be provided to the crops through irrigation. The various sources of water for irrigation are wells, ponds, lakes, canals, tube-wells and even dams. Irrigation offers moisture required for growth and development, germination and other related functions.

The frequency, rate, amount and time of irrigation are different for different crops and also vary according to the types of soil and seasons. For example, summer crops require a higher amount of water as compared to winter crops.

Let us have a look at different types of irrigation and the methods used for irrigation.

The Irrigation Canal

Types of Irrigation

There are different types of irrigation practised for improving crop yield. These types of irrigation systems are practised based on the different types of soils, climates, crops and resources. The main types of irrigation followed by farmers include:

Surface Irrigation

In this system, no irrigation pump is involved. Here, water is distributed across the land by gravity.

Localized Irrigation

In this system, water is applied to each plant through a network of pipes under low pressure.

Sprinkler Irrigation

Water is distributed from a central location by overhead high-pressure sprinklers or from sprinklers from the moving platform.

Drip Irrigation

In this type, drops of water are delivered near the roots of the plants. This type of irrigation is rarely used as it requires more maintenance.

Centre Pivot Irrigation

In this, the water is distributed by a sprinkler system moving in a circular pattern.

Sub Irrigation

Water is distributed through a system of pumping stations gates, ditches and canals by raising the water table.

Manual Irrigation

Thislabour intensive and time-consuming system of irrigation. Here, the water is distributed through watering cans by manual labour.

Methods of Irrigation

Irrigation can be carried out by two different methods:

Traditional Methods

Modern Methods

Traditional Methods of Irrigation

In this method, irrigation is done manually. Here, a farmer pulls out water from wells or canals by himself or using cattle and carries to farming fields. This method can vary in different regions.

The main advantage of this method is that it is cheap. But its efficiency is poor because of the uneven distribution of water. Also, the chances of water loss are very high.

Some examples of the traditional system are pulley system, lever system, chain pump. Among these, the pump system is the most common and used widely.

Modern Methods of Irrigation

The modern method compensates the disadvantages of traditional methods and thus helps in the proper way of water usage.

The modern method involves two systems:

Sprinkler system

Drip system

Sprinkler System

A sprinkler system, as its name suggests, sprinkles water over the crop and helps in an even distribution of water. This method is much advisable in areas facing water scarcity.

Here a pump is connected to pipes which generate pressure and water is sprinkled through nozzles of pipes.

Drip System

In the drip system, water supply is done drop by drop exactly at roots using a hose or pipe. This method can also be used in regions where water availability is less.

Importance of Irrigation

The importance of irrigation can be explained in the following points:

Insufficient and uncertain rainfall adversely affects agriculture. Droughts and famines are caused due to low rainfall. Irrigation helps to increase productivity even in low rainfall.

The productivity on irrigated land is higher as compared to the un-irrigated land.

Multiple cropping is not possible in India because the rainy season is specific in most of the regions. However, the climate supports cultivation throughout the year. Irrigation facilities make it possible to grow more than one crop in most of the areas of the country.

Irrigation has helped to bring most of the fallow land under cultivation.

Irrigation has stabilized the output and yield levels.

Irrigation increases the availability of water supply, which in turn increases the income of the farmers.

Irrigation should be optimum because even over-irrigation can spoil the crop production. Excess water leads to water logging, hinder germination, increased salt concentration and uprooting because roots can't withstand standing water. Thus the proper method is to be used for the best cultivation.

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LANDSCAPE GARDENING

Landscape gardening is an aesthetic branch of Horticulture which deals with planting of ornamental plants in such a way that it creates a picturesque effect. It is a very fascinating and interesting subject. There are several definitions and expressions to define this subject. According to Chambers' dictionary, the definition of landscape is the appearance of that portion of land which the eye can view at once and landscape gardening is the art of laying grounds so as to produce the effect of a picturesque landscape. Landscape gardening can be defined as the decoration of a tract of land with plants and other garden materials so as to produce a picturesque and naturalistic effect in a limited space. So landscape may or may not include plants. According to Bailey, Landscape gardening is the application of garden forms, methods and materials to the improvements of the landscape and the landscape in this connection is any area large or small on which it is desirable to develop a view or design.

Landscape gardening can also be defined as the beautification of a tract of land having a house or other object of interest on it. It is done with a view to create a natural scene by the planting of lawn, trees and shrubs. Landscape gardening is both an art and science of the establishment of a ground in such a way that it gives an effect of a natural landscape. It can be also defined as the imitation of nature in the garden. It can also be defined as improving of total living environment for the people. The expression of landscape may be gay, bold, retired, quiet, etc. This expression will conform to the place and the purpose. It should be a picture and not a collection of interesting objects.

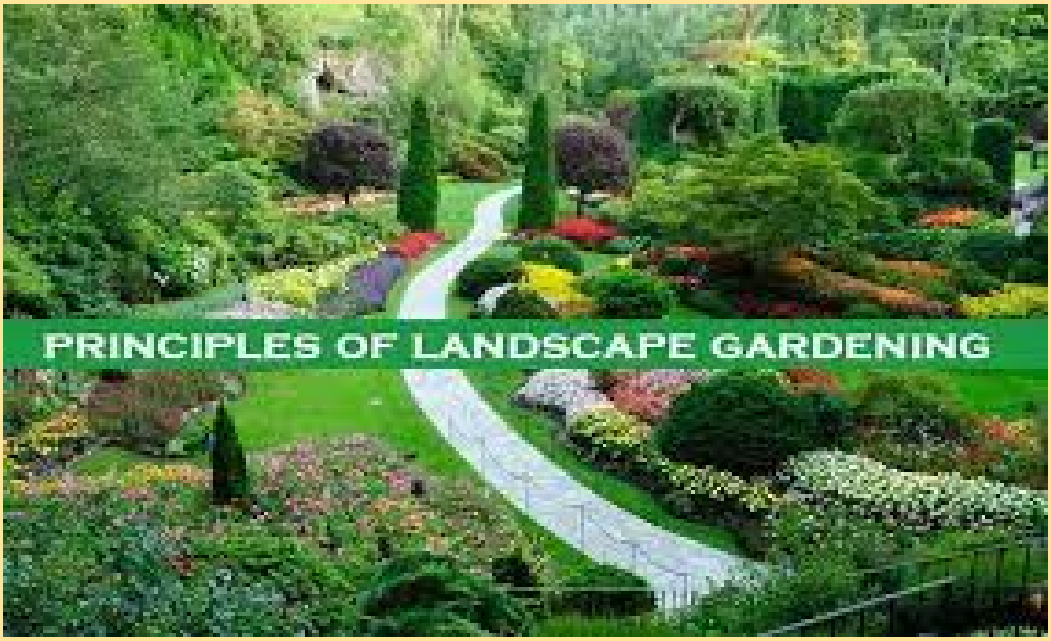
Since the landscape gardening is the making pictures on the ground with plant and other material, landscape designer should be proficient in art, ornamental gardening, ecology and physiology. He should be an architect and engineer to appreciate the relationship between plant form, colours and buildings.

Natural Elements of Landscape

Different types of landscape depending upon prevailing geographical and agroclimatic conditions characterize Earth. There are mountains, hills, glens, valleys, seas, rivers, forests, plains, deserts, lakes, swamps, streams, etc. which comprise major part of natural landscape. At certain points, there is harmony between natural elements like ground forms, vegetation and even animal life. The landscape of such place is beautiful and conveys the feeling or mood of the landscape character like exhilaration, sadness, ceriness or awe. There are many qualities of natural landscape beauty like the picturesque; the ethereal, the serene, the delicate, the idyllic, the graceful, the majestic, the bold etc.

Man has copied the natural elements for improving landscape around him and converted certain areas in the form of garden for his pleasure.

PRINCIPLES OF LANDSCAP GARDENING



General principles of landscaping are as follows:

The ideal landscape garden is like ideal landscape painting which expresses some single thought or feelings. Its expression may be gay, bold, retired, quiet, etc.

Beauty and utility should be harmoniously combined.

Area should be divided into different parts and plan should be conceived for each area. Overall plan should be such that the observer catches the entire effect and purpose of the plan without stopping to analyse its parts.

Simplicity of design should be aimed at in the execution of the plan.

An ideal landscape should have open space.

Let the garden and building merge into each other. There should not be stopping abruptly particularly in front of building. The view of garden from the windows and doors should be very attractive. Planting around the building, climbers against wall and on the porch, decoration of verandah and rooms with attractive foliage, flowering plants, hanging baskets serve to unique the building with garden. Every part of the compound should be planned in such a way that it gives surprising effect to visitor.

Overcrowding of plants and objects should be avoided.

FACTORS AFFECTING THE LANDSCAPE DESIGN

There are several factors which affect the making of suitable design for particular site. These factors are:

Human choice: Man’s ultimate desire is to make his living pleasurable and surroundings confortable. His dominance in making designs and selection of plant material is very well evident. Therefore, different styles of gardening have come into existence.

Site: This is an important factor and according to site, suitable design is made. In formal style gardening, the site is selected according to plan. Topography of the site also affects the design.

Views: Distant views of mountains, hills, woods, valley, etc. are preferred from the place of garden.

Heritage: One inherits the knowledge of botany and aesthetic sense and uses accordingly. Our rich heritage teaches us to use flowers and fragrant trees to improve the surroundings.

Climate: The climate of particular place affects the selection of plant material accordingly. Ideally suited plant material according to climate should be selected.

Soil: According to characteristics of soil types, suitable plants should be selected.

GARDEN STYLES

Garden styles have been changed from time to time with the new ideas and necessities. Broadly, the styles of gardening are grouped into three categories i.e. (I) Formal style, (ii) Informal style and (iii) Free style of gardening

(I) Formal style: Main features of this style of gardening are: First plan is made on the paper and then land is selected accordingly. Plan is symmetrical. These types of gardens are of geometric design i.e. squarish or rectangular. Therefore, the roads are cut at right angle. It has some sort of enclosure. Flower beds are also of geometric shapes. The arrangements of tree and shrubs are necessarily geometrical and kept in shape by trimming and training. Other features like fountains, water pools, cascades, etc. are used for further attraction. The examples of such style of gardening are Persian gardens and Mogul gardens.

(II) Informal Style: This style reflects naturalistic effect of total view and represents natural beauty. This style is just contrast of above formal style. In this, plan is asymmetrical and according to the land available for making garden. Roads, paths are made curvaceous and bending. Water bodies are made of irregular shapes. Hillocks are made to create natural mountainous scenery. Flower beds are made of irregular shapes suiting to surroundings. Plants are allowed to grow in natural form and instead of trimming, annual pruning is done. Japanese gardens are the best example of this style of gardening.

(III) Free style of gardening: This style combines the good points of both formal and informal style of gardening. Rose garden of Ludhiana is an example of this style of gardening.

ART PRINCIPLES OF LANDSCAPE

Landscaping is making of pictures with plant material and, hence, its principles are same as those of art. They are as follows:

Rhythm

Repetition of same object at equidistance is called rhythm. It can be created through the shapes, progression of sizes or a continuous line movement, rhythm creates movement to the eye. In gardens, generally trees of single species of equal height and shape are planted to create this effect. In Mogul gardens, fountains and water canals have also been extensively used to create such effect. Now-a-days other objects like lights are also used to create the effect of rhythm.

Balance

It is very important to maintain the balance on both sides of the central line. The principle involved in making balance of see-saw game can help in understanding this. Equal weights can be balanced only when they are equidistant from the centre. If weights are unequal, the heavier must move towards centre for making balance. The balance may be formal, informal or symmetrical types. Imbalance will look lopsided and will distract the attention. In making the balance with the plants, their form, colour, texture etc. are kept in view.

Accent or emphasis

The accent or emphasis is created in the gardens to avoid the monotonous view. It is the method to stress the most important thing. This also serves as the centre of attraction. Mostly unusual objects like tall fountain, tree, statue etc. are used to create the effect of accent or emphasis. In English gardens, statues have been used extensively to create such effects.

Contrast:

This principle is most useful in emphasising the best features of an object. It can be very easily understood by following contrast colour theory. Against green background, a fleck of scarlet colour will make a contrast and will make scarlet colour prominent. In nature this is very common. Other contrast colour can also be used. Similarly, weeping growth habit against upright growth, dwarf against tall, rough texture against soft texture etc, are some of the examples which can be followed. It is also very important that one of the two contrasting objects must clearly dominate each other. In this way, one becomes feature whereas other acts as supporting background. The contrasting elements of equal power may create visual tensions.

Proportion

It is the relation of one thing to another in magnitude. When two or more objects are put together the proportions are established. In a landscape design, space provided for lawn, paths, herbaceous borders, shrubbery border, trees, buildings and other garden objects should be in a right proportion. It will create harmonious effect and look better. Such effects can be noticed in Persian and Mogul gardens. Out of proportion allotment of area in garden will distract the attention. Proportion helps in space organization.

Harmony

It is an overall effect of various features, styles, and colour schemes of the total scene. The degree of harmony or unity of various elements of landscape is a measure induced in us and is called as beauty. Therefore, the beauty can be defined as the evident relationship of all parts of a thing observed. When

different parts of landscape are correctly placed in right way, produces a harmonious effect. Such landscapes create picturesque effect and appeals to visitors. On the contrary, the absence of harmony or lack of unity is ugliness.

SOME IMPORTANT LANDSCAPE GARDENING TERMS

Axis: It is an imaginary line, which divides garden into two parts. This also connects two or more points. It is presented in the form of a path, line of fountains or trees, etc. If this axis divides garden into two equal parts, it is called central axis. In formal style, axis is central whereas in informal style, it is oblique. This axis controls the movement in the garden from the entrance to the terminal. An axis in garden is directional, orderly or dominating.

Symmetrical plan: In this plan, the different objects are in equilibrium about a central point or on either side of an axis. Symmetrical plan or formal plan is synonymous of beauty and is pleasant and handsome. This is because the symmetry is to be associated with plan clarity, rhythm, balance, unity, etc. Symmetrical plan being precise and disciplined, it requires precision in detail and maintenance and bold in concept.

Dynamic Symmetry: In such symmetrical plan, each pole generates its own magnetic field and between these two fields there is a field of dynamic tension.

Asymmetrical Plan: In such plans, there is absence of symmetry on both the sides of axis but balance, unity and harmony are maintained.

Circulation in Landscaping: In landscape gardening it means a pathway from entrance to terminal point. Circulation varies with the style of gardening and topography. The more of circulation patterns, it has more points of views and attraction. Common circulation patterns are depicted.

Vista: It is a three dimensional confined view of terminal building or dominant element of feature. It may be natural or man-made. Natural vistas are very common around the lofty mountains and snowy peaks. Overall effect of vista may be of its characteristics. It may be calm or induce motion. There are three different parts of a vista viz.

It should be subject to a close control.

It should have a viewing station to see object or objects.

It should have intermediate ground. These three should be satisfactorily united and thus result into an effect of totality.

LAWN AND LAWN MAKING

Lawn:

A lawn is an area where the grass is grown as a carpet for a landscape and is the basic feature of any garden. It serves to enhance the beauty of the garden. A beautiful well-maintained lawn can make the entire landscape look good. Lawn sets a suitable background for a specimen tree or shrub as well as colorful beds and borders. Generally, the lawn should be wide open with access to direct sunshine, especially in front of rockery and a water pool. The lawn is the natural green carpet that serves as the center of the garden for many of the major activities like holding parties, social functions, active and passive recreation etc.

Lawn

Steps in Lawn Making:

1.Preparation of soil.

2. Selection of grass.

3. Planting of grass.

4. Management of lawn.

   a. Mowing.

   b.Rolling

   c.Irrigation.

   d.Weeding.

   e.Fertilization.

   f.Scraping.

5.Management of disease& other problems.

1.Preparation of soil:

Fertile, well-drained soil with good Water Holding Capacity is ideal.

pH should be between 5.5 to 7.0.

Care during summer:

Soil should be up to 45cm depth by spade so that clods of earth are exposed to the sun for killing weeds, insects, and Microorganisms.

Care during rainy season:

Few days before rain starts, break the clods and spread and incorporate 40-50 cartloads/acre of well rotten FYM.

Roll the ground lightly.

During rain, the soil will settle down and weeds will germinate which should be removed before sowing the grass.

2. Selection of grass:

1.Cool Season grasses.

2. Warm-season grasses.

Cool Season Grasses:

They start growth at 5°C and grow at their fastest rate when the temp is between 10-25°C.

They retain their color well in extreme cold and typically grow very dense.

Examples: Bluegrass, Bent grass, Rye grasses, Fescues...etc.

Warm-season grasses:

*They only start growth at temp above 10°C and grow fastest when the temp is between 25°C and 35°C.

*Many warm-season kinds of grass are quite a drought-tolerant and can handle very high summer temp.

Warm Season grasses: Korean grass, Bermuda grass, St.Augustine grass, Carpetgrass, Buffalo grass.

Following grasses are suitable for Indian Conditions;

Buffalo grass:(Stenotaphrumsecundatum)

*Suitable for the shady situation.

*Requires frequent watering.

*Coarse texture.

Buffalo grass

Bermuda grass:(Cynodondactylon)

* Commonly used for planting because of its fast growth.

* Hardiness.

* Less water requirement.

* Response to frequent mowing.

* Fine texture, Suitable for the open sunny situation.

Cynodondactylon

Korean grass:(Zoysia japonica)

*Make cushion-like turf.

*Highly suitable for smaller areas and home lawns.

*Suitable for poor sandy soils, open sunny situation.

*Slow in growth.

*More Cold tolerance.

Zoysia japonica

Fescue grass:

*Course texture.

*Shade tolerant, survive on inferior soils.

Fescue grass

Kikuyu grass:

Pennisetum clandestine

Planting of grass:

Methods of planting:

1.Seeding.

2.Dibbling of roots.

3.Turfing.

4. Bricking.

5. Planting on polythene.

Seeding:

* About 30kg of seeds need for one hectare. The seeds should be sown on a windless day evenly and thinly and covered with fine light soil.

* The ground should have rolled again and water liberally with a rose tank or with a holed pipe fitted with a nozzle.

* The seeds take 5 weeks to germinate.

Dibbling of roots:

* This is one of the cheapest and slowest methods.

* Small roots are dibbled about 15cms apart into the prepared ground.

* The roots spread and grow underground in course of 6 months.

Turfing:

*Turf are pieces of the earth with compact grass grow on them.

* Turf should be cut uniformly thin in the square from the place where the grass is grown short, compact, and free from weeds.

* They should spread on the ground side by side.

* Gaps should be filled with soils.

* The entire turf area should be rolled and watered liberally.

Bricking:

* Bricking is the method to replace the few unhealthy patches in the well-maintained lawn.

* In this method a piece of lawn along with soil in the shape of bricks is taken out and planted and watered immediately.

* This rejuvenates the lawn.

Planting on polythene:

* In this method lawn is grown on thick polythenes.

* First polythene is cut into suitable pieces of desired dimensions.

* Mixture of soil(3-4cm) is sprayed over the polythene sheets and grasses are grown over it.

* It can be rolled and taken to a place and rolled out where the temporary effect is to be created.

4. Management of lawn:

1.Mowing.

2.Rolling.

3.Irrigation.

4. Weeding.

5.Fertilization.

6.Scraping.

Lawn

Mowing:

* Interval of mowing in an established lawn depends upon the season.
* In rainy and winter season mowing is done at the interval of 7-10 days.
* During spring mowing is done at 15 days interval.
* During Summer mowing is done at monthly intervals.

Mowing

Types of mowers:

1.Hand mower.

2.Bullock mower.

3. Tractor Mower.

The mower is the selected basis of the size of the lawn.

Machine drew mower

Hand mower

Rolling:

* Rolling is done so as to suppress the upright growth to anchor the grass family in the soil.
* It also was done to maintain the level of the ground.

Lawn roller

Irrigation:

* Water requirement of the lawn depends on the season, the type of soil and grass-grown.
* During autumn and winter months watering is done at an interval of 10days.
* During spring and summer months watering is done at an interval of 7 days.
* Generally flood irrigation is done in India. But sprinkler irrigation is best.

Sprinkler irrigation

Weeding:

* Regular mowing controls the population of weeds by removal of an upper portion of the weeds and starving the roots.

* Hand weeding is also followed by home lawns.

* Weedicides like 2,4-dichlorophenoxy acetic acid can be sprayed for controlling the deep-rooted weeds.

* Mechanical weeders can also be used.

Mechanical weeder

Fertilization:

* Application of 50-60g/sqm of a mixture of two parts of CAN: 1 part SSP: 1 part of potassium sulfate during the rainy season maintains the healthy growth of grasses.

* Spraying of urea @30g/10 lit of water is also useful for the growth of grass.

Scraping:

* It is done to renovate the old lawn when it becomes old and the grass becomes compact.
* After 3-4yrs during summer months lawn should be scrapped completely with the help of khurpa and raking should be done in both ways.
* Before the start of rain topdressing should be done with a mixture of garden soil, sand, and sieved leaf mold in 1:2:1 ratio.
* Bone meal @1kg/100 m2 should also be applied before the onset of rain.
* Thus grasses grow luxuriantly and will make a compact and healthy turf.

5; Major diseases in the lawn making:

1.Fairy ring.
2.Pale or yellow lawn.

1. Fairy ring:

* It is caused by soil-borne fungi like
    -Marasmius ordeades.
    -Psalliotacampestris.
    -Leipiotamorgani.

These fungi cause a circular ring of thin colored or dead grass.

Rings may be incomplete and given the appearance of an arc or horseshoe.

Grass turns brown and rings widen in the circles from few cms to meters.

Fairy ring

Control of fairy ring disease:

This can be controlled by drenching the soil with the Bordeaux mixture (4:4:50) or by spraying blitox.

2. Pale or yellow lawn:

This may be due to waterlogging conditions or lack of water or due to poor drainage.

The deficiency of N is also a possible reason for yellowing.

Hardening of soil and subsequent oxygen deficiency in the roots is also a possible cause of yellowing.

Yellow Lawn

Control of yellowing:

Providing proper drainage in rain-prone areas.

Regular irrigation in rain fed areas.

Supplementing N fertilizers in the soil.

Loosening the soil with the help of khurpa.

BONSAI CULTIVATION AND CARE

Introduction:

Bonsai can be created from nearly any perennial woody-stemmed tree or shrub species which produces true branches and remains small through pot confinement with crown and root pruning. Some species are popular as bonsai material because they have characteristics, such as small leaves or needles, that make them appropriate for the compact visual scope of bonsai. Bonsai cultivation techniques are different from other tree cultivation techniques in allowing mature (though miniature) trees to grow in small containers, to survive with extremely restricted root and canopy structures, and to support comprehensive, repeated styling manipulations.

Sources of Bonsai

All bonsai start with a specimen of source material, a plant that the grower wishes to train into bonsai form. Bonsai practice is an unusual form of plant cultivation in that growth from seeds is rarely used to obtain source material. To display the characteristic aged appearance of a bonsai within a reasonable time, the source plant is often partially grown or mature stock. A specimen may be selected specifically for bonsai aesthetic characteristics it already possesses, such as great natural age for a specimen collected in the wild, or a tapered, scar-free trunk from a nursery specimen. Alternatively, it may be

selected for non-aesthetic reasons, such as known hardiness for the grower's local climate or low cost (as in the case of collected materials).

Propagation

Plant cuttings can be rooted and grown as potential bonsai.

While any form of plant propagation could generate bonsai material, a few techniques are favored because they can quickly produce a relatively mature trunk with well-placed branches.

Cuttings. In taking a cutting, part of a growing plant is cut off and placed in a growing medium to develop roots. If the part that is cut off is fairly thick, like a mature branch, it can be grown into an aged-looking bonsai more quickly than can a seed. Thinner and younger cuttings tend to strike roots more easily than thicker or more mature ones. In bonsai propagation, cuttings usually provide source material to be grown for some time before training.[3]

Layering. Layering is a technique in which rooting is encouraged from part of a plant, usually a branch, while it is still attached to the parent plant. After rooting, the branch is removed from the parent and grown as an independent entity. For bonsai, both ground layering and air layering can create a potential bonsai, by transforming a mature branch into the trunk of a new tree. The point at which rooting is encouraged can be close to the location of side branches, so the resulting rooted tree can immediately have a thick trunk and low branches, characteristics that complement bonsai aesthetics.

Collecting

Collecting bonsai consists of finding suitable bonsai material in its natural environment, successfully moving it, and replanting it in a container for development as bonsai. Collecting may involve wild materials from naturally treed areas, or cultivated specimens found growing in private yards and gardens. For example, mature landscape plants being discarded from a building site can provide excellent material for bonsai. Hedgerow trees, grown for many years but continually trimmed to hedge height, provide heavy, gnarled trunks for bonsai collectors. In locations close to a tree line (the line beyond which trees do not grow, whether due to altitude, temperature, soil moisture, or other conditions), aged and naturally dwarfed survivors can be found.

The main benefit of collecting bonsai specimens is that collected materials can be mature, and will display the natural marks and forms of age, which makes them more suitable for bonsai development than the young plants obtained through nurseries. Low cost is another potential benefit, with a tree harvest license often being more economical than the purchase of nursery trees. Some of the difficulties

of collecting include finding suitable specimens, getting permission to remove them, and the challenges of keeping a mature tree alive while transplanting it to a bonsai pot.

STYLING TECHNIQUES

Formal

Upright

It is one of the most natural styles where the trunk is perfectly straight. The branches should alternate left to right to suggest age. The bottom third branches are removed and the remainder is drawn downward.

Formal upright style

Informal Upright

This style is characterized by a lightly curving trunk displaying the harsh elements of nature. This can be achieved with ease using wire and/or cords. It is as appropriate for conifers as with deciduous trees.

Informal upright style

Broom

It has a straight trunk that begins to divide and subdivide into many branches. The characteristics are its thick and finely branched crown. Some trees for this style are Beech, Elm, False cypress and Maple.

Broom style

Slanting

It is so called because the general slope of the trunk is highly pronounced. The branches should lie horizontal or droop slightly downward. The surface roots have an unstable appearance but have a well anchored impression.

Slanting style

Windblown

It is rare in nature. This kind of tree is found on cliffs or mountains. The trunk, branches and twigs are trained in a single direction to give the affect of a strong wind and storm.

Windblown style

The Clasped-to-Stone

It is a much loved but difficult to create style. The size and shape of the rock should complement the plant that is set on a gravel or water dish. A whole chapter could be spend on this style.

Clasped-to-stone style

Bonsai are carefully styled to maintain miniaturization, to suggest age, and to meet the artist's aesthetic goals. Tree styling also occurs in a larger scale in other practices like topiary and niwaki. In bonsai, however, the artist has close control over every feature of the tree, because it is small and (in its container) easily moved and worked on. The greater scale of full-sized trees means that styling them may be restricted to pruning and shaping the exterior volume once per growing season, never pruning within the canopy nor bending and forming individual branches. In contrast, in a bonsai being prepared for display, each leaf or needle may be subject to decision regarding pruning or retention, and every branch and twig may be formed and wired into place each year. Given these differences in scope and purpose, bonsai styling uses a number of styling techniques either unique to bonsai or (if used in other forms of plant cultivation) applied in ways particularly suitable to meet the goals of bonsai development.

Leaf trimming

This technique involves selective removal of leaves (for most varieties of deciduous tree) or needles (for coniferous trees and some others) from a bonsai's branches. A common aesthetic technique in bonsai design is to expose the tree's branches below groups of leaves or needles (sometimes called "pads") by removing downward-growing material. In many species, particularly coniferous ones, this means that

leaves or needles projecting below their branches must be trimmed off. For some coniferous varieties, such as spruce, branches carry needles from the trunk to the tip and many of these needles may be trimmed to expose the branch shape and bark. Needle and bud trimming can also be used in coniferous trees to force back-budding on old wood, which may not occur naturally in many conifers. Along with pruning, leaf trimming is the most common activity used for bonsai development and maintenance, and the one that occurs most frequently during the year.

Pruning

The small size of the tree and some dwarfing of foliage result from pruning the trunk, branches, and roots. Pruning is often the first step in transforming a collected plant specimen into a candidate for bonsai. The top part of the trunk may be removed to make the tree more compact. Major and minor branches that conflict with the designer's plan will be removed completely, and others may be shortened to fit within the planned design. Pruning later in the bonsai's life is generally less severe, and may be done for purposes like increasing branch ramification or encouraging growth of non-pruned branches. Although pruning is an important and common bonsai practice, it must be done with care, as improper pruning can weaken or kill trees. Careful pruning throughout the tree's life is necessary, however, to maintain a bonsai's basic design, which can otherwise disappear behind the uncontrolled natural growth of branches and leaves.

Grafting

In this technique, new growing material (typically a bud, branch, or root) is introduced to a prepared area under the bark of the tree. There are two major purposes for grafting in bonsai. First, a number of favorite species do not thrive as bonsai on their natural root stock and their trunks are often grafted onto hardier root stock. Examples include Japanese red maple and Japanese black pine.[1] Second, grafting allows the bonsai artist to add branches (and sometimes roots) where they are needed to improve or complete a bonsai design. There are many applicable grafting techniques, none unique to bonsai, including branch grafting, bud grafting, thread grafting, and others.

Defoliation

Short-term dwarfing of foliage can be accomplished in certain deciduous bonsai by partial or total defoliation of the plant partway through the growing season. Not all species can survive this technique. In defoliating a healthy tree of a suitable species, most or all of the leaves are removed by clipping partway along each leaf's petiole (the thin stem that connects a leaf to its branch). Petioles later dry up

and drop off or are manually removed once dry. The tree responds by producing a fresh crop of leaves. The new leaves are generally much smaller than those from the first crop, sometimes as small as half the length and width. If the bonsai is shown at this time, the smaller leaves contribute greatly to the bonsai aesthetic of dwarfing. This change in leaf size is usually not permanent, and the leaves of the following spring will often be the normal size. Defoliation weakens the tree and should not be performed in two consecutive years.

Another benefit of defoliation is the encouragement of back budding, that is, the formation of new buds on existing branches. This results in finer and more intricate branching in the inside of the tree's canopy, adding to the refinement of the bonsai.

Some species, like the Acer buergerianum (trident maple), respond particularly well to defoliation, and can be defoliated, in some cases, up to three or four times in a single growing season. This accelerates refinement greatly, shortening the developmental timeline of the bonsai.

Repotting

An uprooted bonsai, ready for repotting

Bonsai are repotted and root-pruned at intervals dictated by the vigor and age of each tree. In the case of deciduous trees, this is done as the tree is leaving its dormant period, generally around springtime. Bonsai are often repotted while in development, and less often as they become more mature.

This prevents them from becoming pot-bound and encourages the growth of new feeder roots, allowing the tree to absorb moisture more efficiently.

Specimens meant to be developed into bonsai are often placed in "growing boxes", which have a much larger volume of soil per plant than a bonsai pot does. These large boxes allow the roots to grow freely, increasing the vigor of the tree and helping the trunk and branches grow thicker. After using a grow box, the tree may be replanted in a more compact "training box" that helps to create a smaller, denser root mass which can be more easily moved into a final presentation pot.

WATER GARDEN

Introduction:

Water garden or aquatic garden, is a term sometimes used for gardens, or parts of gardens, where any type of water feature is a principal or dominant element. The primary focus is on plants, but they will sometimes also house waterfowl, or ornamental fish, in which case it may be called a fish pond. They vary enormously in size and style.

Water gardening is gardening that is concerned with growing plants adapted to lakes, rivers and ponds, often specifically to their shallow margins. Although water gardens can be almost any size or depth, they are often small and relatively shallow, perhaps less than twenty inches (50 cm) in depth. This is because most aquatic plants are depth sensitive and require a specific water depth in order to thrive; this can be helped by planting them in baskets raised off the bottom. A water garden may include a bog garden for plants that enjoy a waterlogged soil. Sometimes their primary purpose is to grow a particular species or group of aquatic plants, for example water lilies.

What plants are in a water garden?

Expect to grow most of your aquatic plants in shallow containers that you'll submerge into the water.

Before submerging your plants, know the exact water level each plant can survive in. Some plants can only be immersed in a few inches of water and die if the crown is too far below the water surface. Remember, water plants are depth sensitive.

Floating Plant

These plants float at the top of the water surface. Their roots are anchored at the water garden's bottom, while their leaves and flowers float above the water. Some floating plants are free-floating, meaning the entire plant is suspended on the water and can move freely over the water surface.

Floating plants help provide shade, keep the water clean, and control algae.

Algae love warm temperatures and it needs the sun to perform photosynthesis. Floating plants help lower water temperatures and limit the algae photosynthesis process by blocking sunlight.

Floating plants include:

Duckweed

Water lettuce

Water lilies

Lotuses

Water hyacinth

Spatterdock

Bog plants

Bog plants are often used interchangeably with marginal plants, but there are some differences between the two.

Marginal plants grow well with parts of the crown underwater, while bog plants prefer wet soil above water level. Bog plants, common in bog gardens, typically grow best just on the water garden's exterior, where the ground remains moist but isn't soaking wet.

Bog plants include:

Water iris

Rose pogonia

Ladies tresses

Pitcher plants

Build a Water Garden

Choose your water garden's location wisely. Water gardens offer a great source of relaxation. Don't let its charm and soothing sounds go to waste by installing it somewhere with an obstructed view. Install your water garden near your favorite window, right by the deck, or in your calming flower patch.

Water gardens benefit from the sun. Make sure your aquatic plants get full sun and are not in too m Containers

Water gardens needn't be large. You can grow one in a small container for your container garden, flower beds, or patio.

Check out how The Home Depot builds a small water garden with a pump, bricks, gravel, container, and aquatic plants in this instructional video.

Pumps

A pump ensures your water garden has a healthy ecosystem. Pumps evenly distribute nutrients and oxygen to plants and other aquatic life in your water garden.

Pumps also help to prevent algae and stagnation. Stagnant water can be a breeding ground for mosquitoes.

Water features

Water features such as fountains, bubblers, and waterfalls, can turn your water garden into an oasis. Sit back and listen to the mesmerizing sounds of trickling water as you gaze upon the nature around your water garden.

Water features are also another way to encourage moving water and aeration in your water garden. The moving water helps to add oxygen to the ecosystem and prevent stagnation.

Fish

It’s possible to add pond fish to your water garden. They’re beautiful to look at and can be rewarding to care for. Keep in mind that fish will likely increase the water garden’s maintenance requirements, making it similar to a goldfish pond or garden pond.

How to Maintain a Water Garden

Skipping out on water garden maintenance can get ugly fast. Ignore your water garden’s needs for too long, and you could be dealing with a smelly, dirty environment that now demands even more care.

For a healthy and balanced ecosystem, it’s best to perform routine maintenance on your water garden.

Keep in mind that maintenance will vary depending on your water garden’s design and features. A small container water garden won’t need as much care as a water garden pond.

Below, we’ve listed the most basic, low-maintenance water garden needs. A water garden that’s a koi pond will require more complex maintenance needs beyond these basics.

Manage debris

Leaves, grass clippings, and other debris from the yard are bound to make their way to your water garden. Keep the skimmer net close by so you can collect and remove waste from your water garden.

Encourage plant growth

If your water garden is looking low on plants (perhaps a few have died), add some more. Plants are essential for the health of your water garden as they help keep the water clean, add oxygen, and compete with algae.

Remove dead plants

Dead plants can release toxins into the water garden and contaminate the environment. As soon as you spot dead plants, remove them from the water.

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CULTIVATION OF MANGO

Introduction

Mango (Mangifera Indica) is the most ancient among the tropical fruits and believed to have originated in the Indo – Burma region. India is the major mango producing country in the world with an annual production of 8.50 million tonnes from an area of one million hectares. Mango is basically a tropical plant but endures wide range of temperature. It grows well under tropical and sub-tropical conditions. It gives profitable yield in semi-arid conditions, especially with irrigation.

Requirement

Climate and Temperature

The mango flowers and fruits during dry season, which is characterized by absence of rainfall. Rain or cloudy weather at the time of flowering causes considerable damage to mango as it adversely affects flowering and fruit set and increases incidence of pests and diseases. It grows where temperature drops as low as 00C. And as high as 460C. However, it thrives best at temperature around 270C. It grows well both in low (25 cm) and high (250 cm) rainfall areas. However with annual rainfall around 75 cm, it grows without irrigation.

Soil

The coconut palm can grow in a wide range of soil conditions ranging from laterite, alluvial, red, sandy loam having pH range from 5.5 to 8.0. Soil should be fertile and good drainage without any

hard substratum within one of the surface.

Varieties

The important commercial mango varieties for different parts of India are:

North India: Dashehari, Langra, Chausa, Bombay, Green, SomarBahist

Eastern India: Fazli, Krishna Bhog, Himsagar, GulabKhas, Jardalu

Western India: Alphonso, Kesar, Pairi, Mankurd, Fernandin.

South India: Bangalore (Totapuri), Neelam, Baneshan, Badami, Suvernarekha.

Newly Evolved Varieties: Mallika, Amrapali, Arka Aruna (Hy 10), Arka Puneet (Hy 13), Arka Anmol, Ratna, Sindhu, Sai Sugandh.

Orchard establishment and care

Pit Filling

Pits of 1 x 1 x 1 m are dug at a distance of 10 x 10 meter at plant site in summer. Pits are filled with top soil and 5 to 6 baskets of Farm Yard Manure (FYM) and 2.5 Kg. Super Phosphate. To avoid termite attack 100 gm of 10 percent sevin or chlorudane dust is mixed in the pit.

Planting

Planting of mango grafts of desired variety is done with commencement of rains while in heavy rainfall regions. Planting is best done after censation of heavy rains. Selected healthy grafts with smooth union and true to type, obtained from reliable source should be planted. At the time of planting, the graft is carefully placed in the pit after removing the Polythene bag and soil is packed firmly around the roots. It is irrigated immediately and stalked with bamboo sticks. Young plants are trained by removing lower branches upto half meter from ground level, only 4 to 5 well spaced branches are allowed to grow in different directions to form main limbs of the Tree. Shoots arising on stem below graft joint are removed regularly.

Intercrops/ covercrops

In young orchards, vegetables and other low growing crops like groundnut, blackgram, green gram, cowpea are grown as intercrops/ covercrops. Cultivation helps to check the weed and improves the growth of the trees besides giving some income to the growers till mango plants start bearing 4-5 years after planting.

Fertilizers

A young orchard be supplied with 10 kg FYM + 100 Kg Nitrogen (N) + 50 g Phosphorus (P_2O_5) + 100 g Potassium (K_2O) per tree in the first year and it should be increased with age. The 10 year old tree should get FYM + 1 Kg N + 500 g P_2O_5 + 1000 g K_2O. If irrigation is available, additional dose of 500 g N be given in the month of February – March.

Irrigation

Newly planted grafts be irrigated at 3-4 days interval for 6 months, thereafter interval should be 8 – 10 days depending upon climate Irrigation interval of 10-15 days is adequate for 1-5 year old plants. For bearing trees, irrigation should not be given prior to flowering for 2-3 months as it promotes vegetative growth and reduces the crop. When the fruits have developed to the size of a marble, irrigation can be started and continued at weekly or fortnightly intervals. This helps to reduce fruit drop, promotes rapid fruit development, early maturity and improves quality. However, mango is mostly grown as rainfed crop.

Plant protection

Mango hoppers, insect pest and powdery mildew disease are the major problems on mango, to control both these dusting with 10 percent Carbaryl dust plus sulphur 300 mesh in the ratio of 1:1. Three to four times at fortnightly intervals starting from prior to the emergence of first inflorence is recommended. Trunks of the tree should also be dusted thoroughly.

Harvesting

Mango fruits mature in 3-4 months from flowering, Fruit colour changes from dark green to light green on maturity. Harvesting should be started after few fruits drop, during morning hours. Individual fruits are clipped with 1.5 cm stalk using mango harvester. Harvested fruits are kept on gunny bags under shade. Under sized, bruized and infested fruits are sorted out and healthy fruits are graded into 2 – 3 grades depending upon colour, shape and size and packed in wooden or corrugated boxes.

Export potential

India is the largest producer of mangoes in the world accounting for over 63% of total world production. It accounts for over 60% of the total value of fruits exported from the country. A substantial quantity of this fruit is also utilised by the fruit processing industry. Maharashtra has clear advantage due to exclusive production of Alphonso variety, the share of which in the export is very high.

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CULTIVATION OF JASMINE

INTRODUCTION:

Jasmines constitute a group of fragrant flowers which are commercially grown in many parts of the country as dry land crop and leading states are Tamil Nadu and Karnataka. Jasmine contributes substantially to the national economy and annually more than 20 crores worth of jasmine flowers are produced and sold in India and also exported to neighboring countries. Jasmine flowers are preferred for making special type of flower strings called veni, garlands, floral decorations, extraction of essential oil which is used in preparing high grade perfumes, colognes and flavoring the beverages etc. apart from their medicinal uses which has growing demand in India as well as in many developed countries.
Importantcultivars
There are trailing, climbing, and erect growing species and cultivars. Three important species widely cultivated are Jasminumsambac , Jasminumgrandiflorum and Jasminumauriculatum

SOIL AND CLIMATE:

Soil and climate
Jasmine can be planted on a wide range of soils. Well-drained sandy loams and red loams under tropical conditions are suitable for its cultivation. In clayey soils, there is increased vegetative growth and reduced flowering.

Propagation
Layering and cutting are the main propagation methods. Better rooting of cuttings can be obtained by planting in coarse sand and also by using any of the rooting hormones like IBA (5000 ppm), IAA (1000 ppm) and NAA (5000 ppm). Simple and compound layering methods are followed during June-July to October-November. Layers will be ready for planting within 90-120 days.

CULTURAL OPERATIONS IN JASMINUM

Sambac

Varieties
Gundumalli, Motia, Virupakshi, Sujimalli, Madanabanam, Ramabanam, Single Mogra, Double Mogra, Iruvatchi, Ramanathapuram local etc.

Single mogra

Double mogra

Land Preparation and planting:

After ploughing the land, pits of about 30 x 30 x 30 cm size are taken and filled with topsoil and 20 kg well-rotten FYM per pit. Layers or rooted cuttings are planted in pits with a spacing of 1.25 m X 1.25 m during June to November.

Irrigation:

Irrigation should be given immediately after planting followed by weekly irrigation depending upon weather conditions.

Manuring:

FYM 10 kg and NPK at 60:120:120 g per plant is applied twice once after pruning and again during June - July.

Pruning:

The bushes are pruned to 50 cm height from the ground level during last week of November.

Weed control:

Manual weeding is effective but expensive. Use of weedicides like paraquat is also practised. Mulching also reduces weed population.

Irrigation:

Constant and adequate water supply during peak flowering season is essential for high yield of flowers. After flowering is over, the water supply can be cut off. During summer, irrigate twice a week.

Season of flowering and harvest:

Flowering commences in March - April. Fully developed unopened flower buds should be picked in the morning hours.

Yield:

bout 5t / ha can be obtained.

Auriculatum

Varieties

Co-1, Co-2, Long Point, Long Round, Short Point, Short Round, Parimullaietc

Iruvatchi

Jathimalli

Propagation and planting:

Layers or rooted cuttings are planted in 30 cm x 30 cm x 30 cm pits dug at 1.8 x 1.8 m spacing during June to November.

Manuring:

FYM 10 kg/ha is applied with 120:240:120 g NPK/plant in six split doses at bimonthly intervals. The first dose is given immediately after pruning.

Pruning:

The bushes are pruned to 45 cm height from ground level during the last week of January.

Season of flowering and harvest:

Flowering extends from May to November. Fully developed unopened flower buds should be picked in the morning hours.

Yield:

About 5,000 kg of flower buds/ha can be obtained.

Grandiflorum

Varieties

Co-1, Co-2, Thimmapuram, Lucknow etc.

Co-1

Co-2

Propagation and planting:

Layers or rooted cuttings are planted at 2.0 m x 1.5 m spacing in 30 cm x 30 cm x 30 cm pits during June - November.

Manuring:

FYM or compost 10 kg, NPK at 60, 120 and 120 g per plant is applied in 2 split doses in December after pruning and again in June - July.

Pruning:

Pruning is done during the last week of December to 45 cm height from ground level. Season of flowering and harvest:

The season starts from May to October. Fully developed unopened flower buds are picked in the morning for fresh flower trade. For oil extraction opened flowers are to be picked before 10 a.m.

Yield:

The flower yield is 6 t/ha of flower buds.

INSECTS PEST MANAGEMENT:

Bud worm:

Spray Monocrotophos 2 ml/lit to control the pest.

Blossom midge:

Spray Monocrotophos 2 ml/lit or Quinalphos 2 ml/lit to control it.

Red spider mite:

Spray Wettable Sulphur 50 WP @ 2 g/lit or Dicofol 2.5 ml/lit to control the mite infestation.

Leaf eating caterpillar:

Leaf eating caterpillar can be controlled by spraying Quinalphos 2 ml/lit.

White ants:

To control, dust Lindane to the pits before planting @ 5 g/pit

DISEASE MANAGEMENT:

Yellowing of leaves

It is caused by 3 factors viz., iron deficiency, nematode infection and root rot disease.

Iron deficiency

It can be rectified by spraying Ferrous sulphate 5 g/lit at monthly intervals until the chlorotic symptoms disappear.

Nematode

Initially test the soil for nematode infection. Apply 10 g of Temik granules near root zone and then irrigate the field.

Root rot

Drench the soil around the plant with Copper oxychloride at 2.5 g/lit.

Leaf spot

Spraying of Mancozeb at 2 g/lit. from the onset of monsoon at monthly intervals will control the disease occurrence.

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KITCHEN GARDENING

Introduction:

Kitchen garden is the growing of fruits and vegetables at the backyard of house by using kitchen waste water.Otherwise called as Home garden or Nutrition garden or Kitchen gardening or Vegetable gardening.

Advantages of Kitchen garden :

Supply fresh fruits and vegetables high in nutritive value.

Supply fruits and vegetables free from toxic chemicals.

Help to save expenditure on purchase of vegetables.

Vegetables harvested from home garden taste better than those purchased from market.

Effective utilization of kitchen waste water and kitchen waste materials.

Exercise to the body and mind.

Site selection :

Backyard of house

Preferably open areas with plenty of sunlight near the water source

Size and shape of vegetable garden depends on

Availability of land

Number of persons in family and

Spare time available for its care

Layout of Kitchen garden

Fence – Barbed wire fence or live fence with agathi

Perennial crops (Mango, Sapota, Acid lime, Amla, Morniga) should be planted

at the peripheral areas

of kitchen garden (avoid shading)

One or two compost pits may be provided on one corner

Fences on all sides should be trained with Cucurbitaceous vegetables

Divide the area into equal sized plots for raising annual vegetable crops

As intensive and continuous cropping is done in a kitchen garden.

Fertility and texture of soil may be maintained by applying adequate quantities of organic

Manures frequently.

Ridges and furrows are formed in each plots.

Season of planting: June – July, September – October

Bee-hive may be provided for ensuring adequate pollination of crops besides obtaining honey.

However, in order to harvest good crop, chemical fertilizers are also essential.

Pick and destroy the larvae found on fruits and vegetables and then spray

Neem oil @ 4 ml/liter of water or Neem Seed Kernel Extract @ 3 %.

Avoid spraying of toxic chemicals.

Method of planting :

Spacing for crops

Tomato, Brinjal and Chillies	:	60 x 60 cm
Cow pea	:	60 x 45 cm
Bitter gourd	:	2 x 2 meter
Onion	:	15 x 10 cm
Tapioca	:	60 x 60 cm
Yam	:	60 x 60 cm

Initially irrigate the plots and transplant the seedling at the required spacing and irrigate on the

Third day of Planting. Direct planting dibble 2-3 seeds/hill and irrigate sufficiently and also irrigate on

The third day of sowing after germination thin 2 seedlings.

Maintenance of Kitchen garden

Grow the plants on the fence by training

Dump all the kitchen waste in the manure pits and maintain in wet condition

Irrigation:

As and when necessary

Manures and Fertilizers:

Apply the decomposed kitchen waste to all the crops
Complex fertilizers @ 5 gram/plant at 30, 60 and 90 day of planting

Weeding:

As and when necessary

Harvest:

When there is a colour change from green to yellow or orange

Plant Protection

Pick and destroy the larvae found on fruits and vegetables and then spray

Avoid spraying of toxic chemicals.

Organic method of plant protection

Neem oil

Neem seed kernel extract

Panchakavya

Implements used in kitchen garden

Spade

Pick Axe

Hoe

Hand sprayer

Rode can

Rose

Secature

Economic benefits of gardening

Gardeners feed their families first and then sell, barter or give away surplus garden foods. In certain contexts, however, income generation may become the primary objective of the home garden. In any case, it is counterproductive to impose the nutrition objective to the exclusion of the income generation objective, since in most contexts they are linked and compatible. The potential economic benefits of home gardening include the following:

Gardening gives dual benefits of food and income generation;

Gardens provide fodder for household animals and supplies for other household needs (handicrafts, fuel wood, furniture, baskets, etc.);

Marketing of garden produce and animals is often the only source of independent income for women.

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