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UNIT -IV

Herbal Gardening

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Gardening

- The laying out and care of a plot of ground devoted partially or wholly to the growing of plants such as flowers, herbs, or vegetables.

- Gardening can be considered both as an art, concerned with arranging plants harmoniously in their surroundings, and as a science, encompassing the principles and techniques of plant cultivation.

- Because plants are often grown in conditions markedly different from those of their natural environment, it is necessary to apply to their cultivation techniques derived from plant physiology, chemistry, and botany, modified by the experience of the planter.

- The basic principles involved in growing plants are the same in all parts of the world, but the practice naturally needs much adaptation to local conditions.

PRINCIPLES OF HORTICULTURE

UNIT- IV

HERBAL GARDENING

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Herbal garden

Herbal Garden refers to growing of Medicinal and Aromatic plants (MAPs) which are having preventive and curative properties against diseases or ailments.

An herbal garden is a space for growing herbs and medicinal plants. They can be used for a variety of purposes, including:

Learning: Herbal gardens can teach people how to identify and preserve herbs and medicinal plants.

Research: Herbal gardens can provide raw materials and fresh plant specimens for research into herbal drugs and microbiology.

Conservation: Herbal gardens can help preserve important herbs.

Health and well-being: Herbal gardens can promote health and well-being.

Environmental consciousness: Herbal gardens can help foster environmental consciousness.

Food flavoring: Herbal gardens can contain plants that contribute to food flavoring.

Some common plants in herbal gardens include:

•**Apiaceae**: Parsley, cumin, coriander, caraway, fennel, celery, angelica, and dill

•**Lamiaceae**: Mint, basil, thyme, rosemary, and sage

•**Alliaceae**: Onions, chives, shallots, and garlic

Here are some tips for growing herbs:

•Provide plenty of sun, but protect from very strong sun.

•Use well-drained, soft soil with lots of leafy organic manure.

•Keep the soil moist but not waterlogged.

•Weed regularly.

•Check for pests and disease.

•Harvest carefully so as not to damage the plant or hamper its growth

Ornamental gardening

- Ornamental gardening is the practice of planting plants for aesthetic purposes, rather than for food or manufacturing. Ornamental gardens are designed to be pleasing to the eye, and can include a variety of plants such as flowers, shrubs, grasses, and succulents.
- The cultivation of ornamental plants is called floriculture, which is a major branch of horticulture. Ornamental horticulture is another branch of horticulture that focuses on the cultivation and use of decorative plants.
- Ornamental Plants are also referred to as garden plants has beauty as its main trait. They are usually grown in the flower garden for the display of their flowers. It is a plant primarily grown for its beauty either for screening, accent, specimen, color or aesthetic reasons.

History of Ornamental Plants

- The history of ornamental gardening started at least 4,000 years of human civilization. Egyptian tomb paintings of the 1500 BC are some of the earliest physical evidence of ornamental horticulture and landscape design.
- It depicts depict lotus ponds surrounded by symmetrical rows of acacias and palms.

- Aesthetics
  - Plants have great "aesthetic" value which means they add to the beauty of the places that we live. How many of us would be want to live without the plants around us, including the forests, woodlands, and grasslands surrounding our towns and cities? Native grasses and wildflowers provide use with a link to our history.

Aesthetic value

- Great aesthetic value is attached to biodiversity
- Stretches of barren lands with no signs of visible life is not a pleasant sight
- Eco-tourism is based on the aesthetic value of biodiversity
- Ecotourism is estimated to generate about 12 billion dollars of revenue annually

Croton

- Croton is a common houseplant grown for its striking foliage. It is one of six species of broadleaf evergreen perennials, shrubs, and small trees in this genus in the euphorbia family (Euphorbiaceae) which are native to tropical Asia and the western Pacific region (not to be confused with *Croton*, another genus of more than 700 species in the same family, in which it was formerly incorrectly classified as *Croton variegatum*).
- This evergreen shrub or small tree varies widely in leaf color and pattern and numerous cultivars have been developed. It is a tender perennial, hardy only in zones 11-12. In subtropical and tropical climates they are frequently used as landscape shrubs for dramatic hedges, bold focal points in gardens, or potted specimens around buildings.
- The plants of this genus were described and introduced to Europeans by Georg Eberhard Rumphius. The common names for this genus are rushfoil and croton, but the latter also refers to Codiaeum variegatum.

Traditional uses

C. tiglium oil has been used in traditional Chinese medicine to treat severe constipation or heal lesions, and is used as a purgative. Wang Haogu first observed that croton seeds could also be used to treat diarrhea. It is a source of the organic compound phorbol and its tumor-promoting esters, such as 12-*O*-tetradecanoylphorbol-13-acetate. In the Amazon, the red latex from the species *C. lechleri*, known as sangre de drago (dragon's blood), is used as a "liquid bandage", as well as for other medicinal purposes, by native peoples.

Gold star croton

Bottle Brush Plant

Medicinal Garden

A medicinal garden, also known as a healing or herb garden, is a space that contains plants known for their medicinal properties. Medicinal gardens can be used for a variety of purposes, including:

Conservation

•Medicinal gardens can help conserve rare, endangered, and threatened plant species.

Education

•Medicinal gardens can be used as living laboratories to teach people about the medicinal properties of plants, as well as their uses and cultivation techniques.

Community resource

•Medicinal gardens can offer public access to educational programs, workshops, and wellness activities.

Some plants that can be grown in a medicinal garden include: Chamomile, Lemon balm, Calendula, and Aloe vera.

Medicinal plants have been used since prehistoric times, and the chemicals they contain work in similar ways to pharmaceutical drugs. However, the effects of taking a plant as medicine can be complex because a single plant may contain many substances.

Medicinal Herb Gardening

What is Medicinal plant ?

- Medicinal plants are plants that have a recognized medical use.
- Their use ranges the production of mainstream pharmaceutical products to herbal medicine preparations.
- Herbal medicine is one of the oldest forms of medical treatment in human history and could be considered one of the forerunners of the modern pharmaceutical trade.

1. TULSI

- Blood purifier
- Preventive against malaria & dengue fever
- Chewing tulsi leaves relieves cold & flu
- Chewing 12 leaves of basil, twice a day prevent stress.
- The leaves are a nerve tonic & also sharpen memory.
- decoction of the leaves + honey + ginger = effective remedy for bronchitis, asthma, influenza, cough and cold
- juice of basil leaves + honey (if taken regularly for 6 months) → expel renal stone via the urinary tract.

2. NEEM

- Neem inhibits allergic reactions when applied externally or eaten.
- Oral doses of neem leaf extracts
- reduced insulin requirements by between 30% and 50% for diabetes.
- Neem extracts give significant protection from discomfort and speed the healing of gastric problems
- Neem quickly kills external parasites and a neem decoction is safer and just as effective as standard treatments for head lice and scabies. .

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3. ALOE-VERA (Gritkumari)

- green leaves contain aloe gel and a sticky yellow residue called latex.
- Burn healing
- Wound healing
- Treat Sunburn
- Radiation-induced skin reactions
- Aloe with conditioner for silkier, smoother hair.
- Take orally to reduce cholesterol and triglycerides for a healthy heart.

4. Bhringaraj

- the main herb for the hair care and cirrhosis
- works to rejuvenate kidneys and liver. As oil, it treats graying and balding, makes the hair darker, and promotes deep sleep. It also improves complexion.
- the root powder is used for treating hepatitis, enlarged spleen and skin disorders
- anti-inflammatory properties, the herb is also used for treating hyperacidity.

5. TURMERIC

- stimulate digestion
- boost liver function
- Curcumin a means of reducing breast cancer risk among women
- When paired with vitamin D, curcumin may help protect against Alzheimer's disease
- curcumin can protect against liver damage.

6. GINGER

- stomach-soothing effects
- easing post-surgery nausea and vom
- Sipping ginger tea can help calm an stomach, as well as ease congestion you've got a cold.
- ginger extract may slow the growth of colorectal and ovarian cancer cells,
- useful in treating chronic inflammation because it partially inhibits two important enzymes that play a role in inflammation gone away -- cyclooxygenase (COX) and 5-lipoxygenase (LOX).

7. AMLA

- To stimulate appetite (Use pickles and preserves made from the green fruits)
- For hemorrhage, diarrhea and dysentery
- Seed fried in ghee and ground in conjee is applied as Lep to the forehead to stop bleeding from the nose.
- For hiccup and for painful respiration
  Use juice or extract of the fruit combined with honey and pipli
- Due to vitamin C and polyphenols, is a antioxidant.
- Benefits heart, eyes, and brain

Indoor Gardening

Indoor Gardening means growing plants inside whether it is home, an apartment, an office building, restaurant , etc. There area many plants which we can grow. Some of examples are : Snake plant, Fern Plant, Money plant, Aloe Vera etc.

Indoor garden:

The art of growing different plants inside the house is known as Indoor Garden. The main purpose of indoor gardening is to create a beautiful, attractive and lively atmosphere inside the house. Indoor gardening typically embodies the concepts of self-care and customized setup, which have both concrete and symbolic meaning in communication. The benefits of plants for health are well-reported.Indoor plants have numerous advantages for our mental and physical well-being.

What are the Advantages of Indoor Plants?

Plants have always been known to enhance life quality in one way or another. The initial placement of many houseplants follows the same concept. Positively, they add to the enjoyment of the vista. Types Indoor Gardeningn, Container Gardening, Hydroponics, Miniature Garden, Treearium, Aquaculture. Here are some benefits of growing houseplants and why you should have a reason to consider them.

1. House plants can enhance indoor air quality.
2. They can improve your mood and promote relaxation.
3. They could also aid in lowering stress levels.
4. Boosting mood and productivity

5. Reducing noise levels
6. Improving sleep quality and physical health
7. Reduced stress and anxiety
8. Natural decoration

Important features

1. Beautifies the interior decoration.
2. Oldest way of foliage cultivation.
3. Sense of interest for recreation
4. Popular in metro cities due to scarcity of space.
5. Divides the living areas
6. Bring freshness in house.

Advice for caring for indoor plants

- Taking care of indoor plants can be a rewarding and relaxing experience. **Repotting**: If your plant has outgrown its container, repot it into a larger pot with fresh potting soil.
- **Humidity:** Many indoor plants prefer high humidity levels. Think about putting a humidifier next to your plants or regularly spraying them.

Provide proper lighting: For optimal growth, most indoor plants require bright, indirect sunshine. Make sure the area where you plant them gets adequate natural light. Your plants need enough light, so supply it. Most indoor plants like bright, direct light. Remember to research and educate yourself on the specific care needs of your indoor plants to ensure they

stay healthy and happy.

Interior landscaping

- It combines a range of strategies ranging from long-life plants and displays to more short-term floral arrangements.
- It includes using accessories such as pots and containers to complement the architecture and interior design of a space.
- Generally, two kinds of plants grown in indoor places the flowering plants which are spectacular in appearance by virtue of their colourful flowers. The other category belongs plants for permanent display with their graceful foliage and sometimes with their architectural or unusual form.

- House plant should remain evergreen to retain its permanent decorative character.

Plants suitable for indoore gardening: -

Coleus (*Plectranthus scutellarioides*)

Aglaonema (*Aglaonema commutatum*)

Spiderwort (*Tradescantia zebrina*)

Burgundy rubber plant (*Ficus elastica* 'Burgundy')

Aluminum plant (*Pilea cadierei*)

Triostar stromanthe (*Stromanthe sanguinea)*

Bromeliad (*Bromeliaceae* genera)

Polka dot plant (*Hypoestes phyllostachya*)

Nerve plant (*Fittonia spp.*)

Echeveria (*Echeveria* spp.)

Rex begonia, fancy-leaf begonia (*Begonia rex-cultorum)*

Cordyline, Hawaiian ti plant (*Cordyline terminalis*)

Purple shamrock, false shamrock (*Oxalis triangularis*)

Pink princess philodendron (*Philodendronerubescens* 'Pink Princess')

Tricolor rubber plant (*Ficus elastica* 'Tricolor')

Neon pothos (*Epipremnum aureum* 'Neon')

Prayer plant (*Maranta leuconeura*)

Calathea (*Calathea spp.*)

Peperomia rosso (*Peperomia caperata* 'Rosso')

Snake plant (*Dracaena trifasciata*) *etc.*

Reasons for Indoor Gardening

Indoor gardens can be grown in any indoor space, making them a great option for homes, offices, restaurants, and other spaces where people want to bring a little bit of life and color inside. With an indoor garden, we have full control over the environment in which our plants are growing. So whether you're looking for a way to bring some natural beauty into your home or office, or simply want to nurture a small corner of the world on your own terms, starting an indoor garden is the perfect solution.

What are the side effects of indoor plants?

If houseplants don't get enough light and moisture, they can get mould, fungal, or bacterial diseases on their leaves. The plant can suffer damage from bacterial infections, fungi, and mould in a number of ways. Furthermore, the diseases may cause contaminants and mould spores to be released into the air you breathe.

Foliage Plants

- The foliage garden also presents an eye-opening range of various leaf shapes and textures. Different plants adapt differently to the habitats that they grow in. Leaves come in many forms such as heart (cordate) or palm (palmate) shaped.

- **Foliage plants** are green, leafy plants grown for their beautiful leaves rather than their flowers. They come in various shapes, sizes, and colors, making them perfect for adding a touch of nature to your home or garden. These plants are easy to care for and require minimal maintenance. Buy Foliage plants online for your home garden from **The Affordable Organic Store**. Our plant saplings bring out the best in your indoor and outdoor spaces and can provide shade, color, and cover for various needs. The plants have numerous benefits and can be given as gifts to your loved ones.

What are Foliage Plants?

- Foliage plants are plants considered to have decorative, colorful, and interesting leaves. Such plants can create interesting garden spaces and can provide shade, color, and cover for a range of needs. Using foliage for decoration and cover has the benefit of having a long-lasting effect that can outlast shorter-term flowers and annuals. This can have such benefits as ongoing decorative appeal, longer-term shading or cover, and even food sources where relevant.

Type of Foliage Plants

- In India, Caladium, Coleus, Croton, Dracaena, and Ti Plants are among the more well-liked foliage plants.
- foliage leaf can be defined as an unspecialized leaf composed of flat lamina and often a petiole, which is the primary seat of photosynthesis and transpiration in plants and have them.
- You can call these a bunch of flowers, these are actually poisonous. example – broad leaves of apple, oak leaves.

Using Foliage Plants in Community Gardens

- In community gardens, foliage plants can serve a range of purposes.
- They can be used to create privacy screens, reduce noise pollution, and provide habitat for wildlife.
- Foliage plants can also be used to create themed gardens, such as herb or butterfly gardens, which can be enjoyed by the community.

Using Foliage Plants in Scale Gardens

- In scale gardens, foliage plants can be used to create a sense of depth and dimension.
- By using plants with different textures and heights, you can create a layered effect, which can make a small garden feel much larger.
- Foliage plants can also be used to create focal points and add interest to your garden.

Selecting Foliage Plants

When choosing foliage plants, some things to consider include:

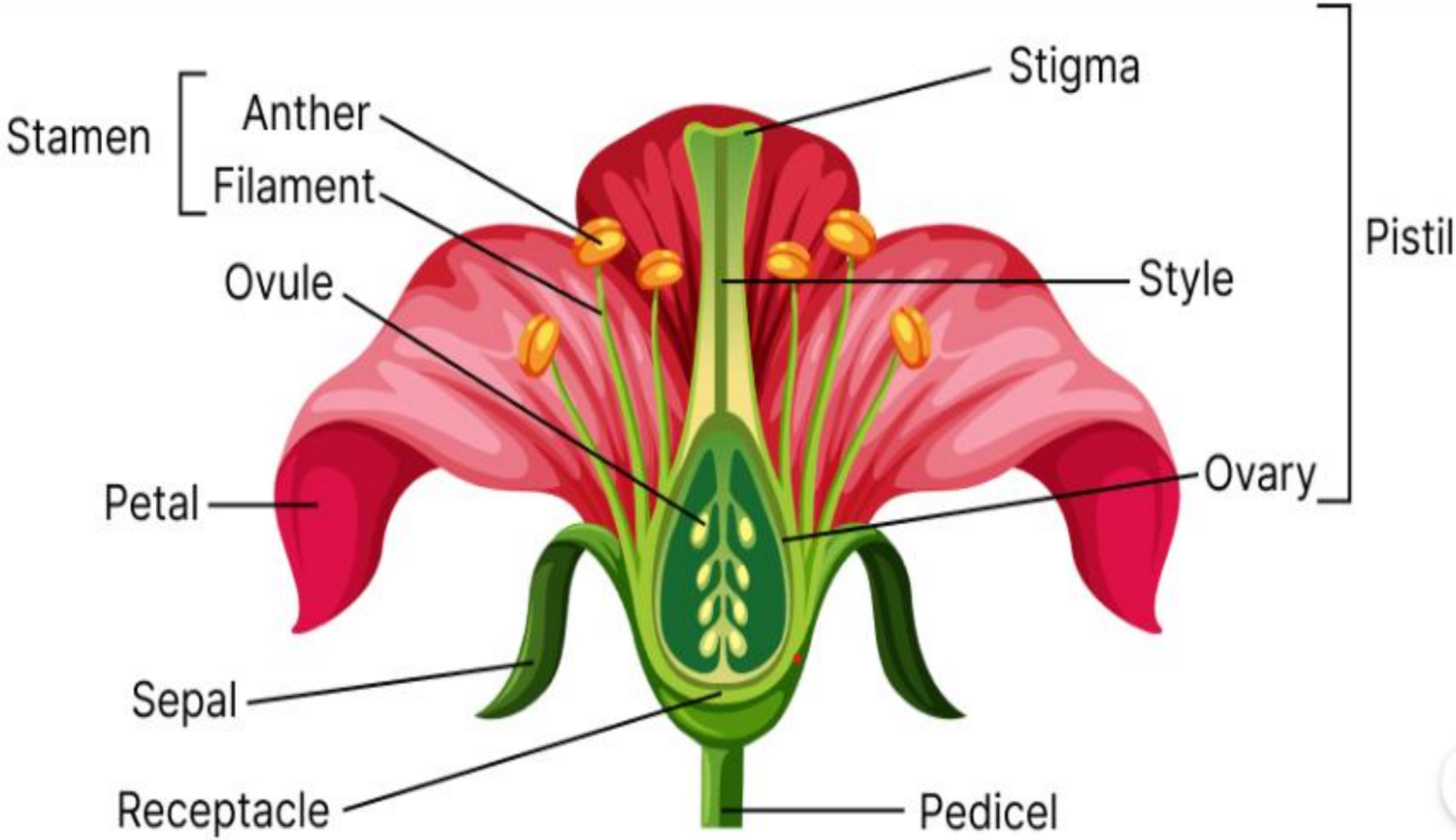
- The colors – is there a particular grouping of colors needed in the area where the plant or plants are being placed?
- The ability of the foliage plants to cope with the temperature ranges.
- If indoors, the suitability of the plant for growing in a container and being indoors.

Flowering Plants

- Angiosperms are plants that produce flowers and bear their seeds in fruits. They are the largest and most diverse group within the kingdom Plantae, with about 300,000 species. Angiosperms represent approximately 80 percent of all known living green plants.

What is a Flowering Plant?

- Flowering plants are plants that bear flowers and fruits and form the clade Angiospermae, commonly called angiosperms. The term "angiosperm" is derived from the Greek words angeion and sperma, and refers to those plants that produce their seeds enclosed within a fruit. Angiosperms have male and female reproductive structures present in a flower. It is a characteristic feature of angiosperms.



Parts of the Flower


St Bernard's Lily (Anthericum liliago)


Bermuda Buttercup (Oxalis pes-caprae)


Oleander (Nerium oleander)


Lantana (Lantana camara)


Scarlet Pimpernel (Anagallis arvensis)


Verbascum (Verbascum sinuatum)


Common Mallow (Malva sylvestris)


Spanish Oyster (Scolymus hispanicum)


Stork's bill (Erodium malacoides)

hanging basket

- A hanging basket is a container that holds plants and is suspended from a chain, rope, or other material. They are often used for decoration, and are a great way to have fresh plants and flowers even if you don't have much garden space.
- Here are some things to know about hanging baskets:

Materials

- Hanging baskets are typically made of wire or wood and filled with a growing medium like burlap.

Uses

- Hanging baskets can be used for decoration around homes and other structures, or for greenhouse cultivation. They can also be used in public areas to enhance the environment.

Placement

•Hanging baskets are often hung from buildings, street furniture, or free-standing frames called hanging basket trees.

Care

•To keep plants healthy, you can deadhead annuals to remove dead or dying flowers, which can encourage more blooms.

•You can also prune trailing plants to promote new growth.

Soil

•For good drainage, mix soil with sand or perlite to help aerate the soil and improve root growth.

Advantages

•Space: Hanging baskets are a good option when there's limited space on a patio, deck, or on the ground.
•Easy to use: Hanging baskets are easy for children and seniors to use.
•Maintenance: Hanging baskets are easy to water and maintain because they're elevated. Some hanging baskets even have built-in reservoirs.
•Pest and disease control: Hanging baskets can help reduce the risk of ground-dwelling pests and fungal diseases.

Disadvantages

•Drying out: Hanging baskets dry out faster than plants in the ground or large containers.

•Watering: Watering hanging baskets can be difficult.

•Maintenance: Hanging baskets require regular watering, fertilizing, and deadheading.

•Vacation care: When you're away, you'll need to arrange for someone to care for your hanging baskets.

•Storm damage: Strong winds can damage the leaves, branches, and stems of plants in hanging baskets.

•Water damage: Dripping water from hanging baskets can cause wood rot

Bonsai

•A bonsai plant is a living tree or shrub that's been trained to look like a miniature, full-sized tree. The art of bonsai involves growing and training trees in containers using techniques like pruning and wiring. Origin

The art of bonsai originated in China and was influenced by Japanese Zen Buddhism. The word "bonsai" is Japanese and literally translates to "planted in a container".

•Inspiration

Bonsai trees are inspired by natural images of trees, such as trees growing in mountains, by the coast, or near rivers.

•Types of trees

Many types of trees can be used to grow bonsai, including pines, maples, cherry and plum trees, and quince and persimmon trees.

•Techniques

Bonsai trees are trained using techniques like pruning roots and branches, and tying branches with wire.

•Beginner-friendly

Bonsai can be beginner-friendly, especially when starting with the right type of tree.


一位 銘「謙信峠」
樹齢約 800 年
上杉謙信伝承樹

Training

The physical techniques that control the size, shape, and direction of plant growth are known as training or in other words training in effect is the orientation of a plant in air through techniques like tying, fastening, staking, supporting over a trellis or pergola in a certain fashion or pruning of some parts.

Principles of training:

1. Branches should be spaced at least 15 cm alternately on the main stem and not all at the same place.
2. They should be evenly distributed around the stem.
3. The branches should not be allowed to grow upwards. Branches should have a medium crotch.

Objectives

1. To facilitate orchard cultural operations.
2. To provide an attractive appearance.
3. Lightening to allow air to enter the tree and to expose maximum leaf surface to the sun.
    - for increasing production
    - for complete colour development
4. To protect the tree trunk from sunburn injury.
5. To secure a balanced distribution of fruit-bearing parts on the main limbs of the plant.

Methods of Training

The method of plant training is determined by the nature of the plant, climate, purpose of growing, planting method, mechanization, etc. and hence, the wise choice is necessary.

Training in herbaceous annuals and biennials

- These plants are usually grown without changing their growth pattern due to the large number of plants in the area.
- However, plants of some ornamental importance and climbing nature can be pruned in the following ways.
- Staking or supporting plants such as vines.
- Training of vine-type fruit plants or indeterminate types of tomatoes on pergola or trellis.

- Pinching to encourage lateral growth to give a bushier or fulsome appearance to potted plants such as asters, marigolds, and chrysanthemums.
- Removal of lateral buds to form a single stem for larger flowers such as chrysanthemums and dahlias.
- Tying potted chrysanthemums to bamboo sticks and tying different twigs together.

Training of woody perennials

- Woody perennial plants, which remain in one place over wide distances and for a long period, are cultivated to produce quality fruits and develop strong structures for ornamental beauty in different sizes (topiary).
- The following training methods are used in these plants.

1. Central Leader system:

- In this system, the main trunk of the tree is allowed to grow freely.
- The first branch is kept at a height of 45 to 50 cm from the ground level and other branches are kept at a distance of 15 to 20 cm on the main stem.
- If the central leader is allowed to grow indefinitely; It will grow more quickly than lateral branches resulting in a strong, robust closed center and tall tree. In such a tree, the fruiting is confined to the top part of the tree.

Central Leader System

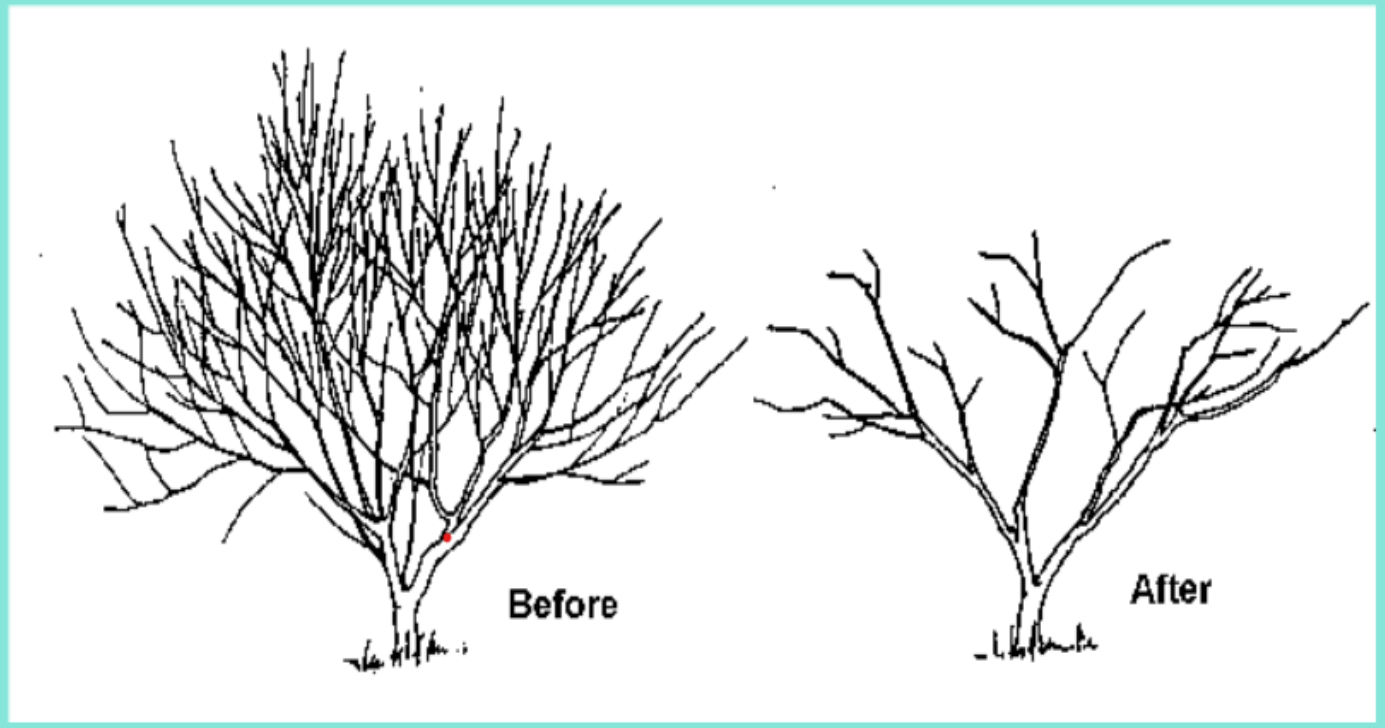
This system is also called a **close centre**, because the center of the plant is closed and is also known as a **pyramid system** because the trained plant looks like a pyramid. This training system is used in the case of some varieties of apple and pear

Merits and demerits:

1. The main advantage of this system is the development of a strong crotch.
2. Its main disadvantage is the lack of light in the interior of the trees. This weakens the central apex and thus shortens the life of the tree.
3. Since the trees are very tall, harvesting and spraying become difficult and costly.
4. Lower branches, which remain more or less in shade, eventually become weak and less fruitful.
5. Due to the very high size of the plants, there is an increased risk of damage from storms.
6. This method of training is not suitable for high-altitude areas and hot dry places where wind velocity is high.

2. Open Centre system:

- In this system when the plant reaches a height of 40 to 50 cm. The main stem is then cut off from the top (deheaded).
- From the subsequent vegetative growth, 4-5 branches well-arranged and distributed around the main stem are selected.
- Thus, the trained tree attains less height.
- In this system, the plants take the shape of a bowl.
- This training system is used in plum and peach.



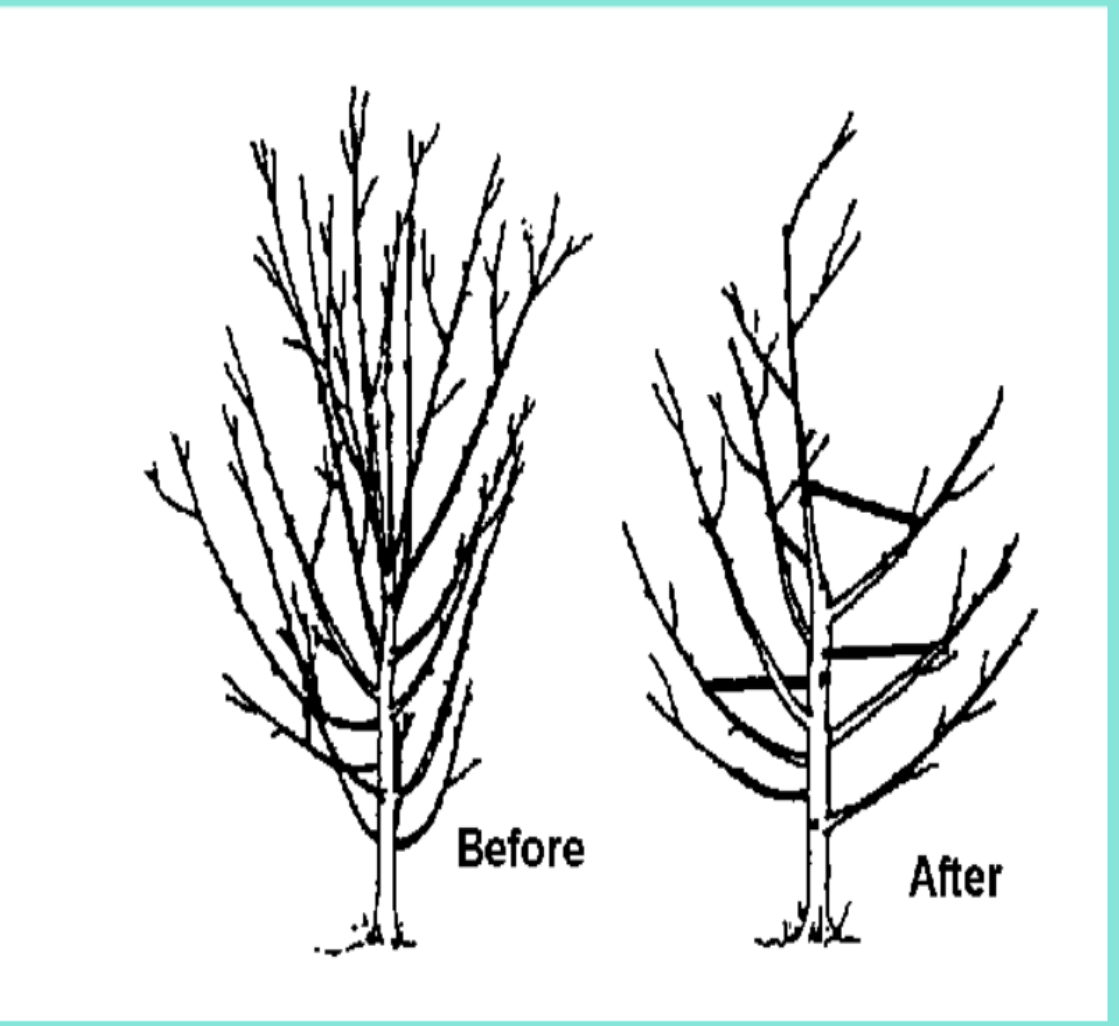
Open Centre System

Merits and demerits:

- It helps in transmitting the light to all parts of the tree which is helpful (a) for better color development of the fruit (b) to spread the fruiting area over the entire area of the trees.
- Due to the low height of the trees, there is a facility for pruning, spraying, harvesting, etc.
- Branches form weak and narrow crotch, which can often break due to high stress such as heavy bearing and strong winds.
- It is also possible for the central stem to get sunburned.
- The branches are very close to each other in the same place.
- In this system, the plants take the shape of a **"bowl or vase",** which provides a good base for the accumulation of snow. Hence this system is not suitable for high altitude areas where snowfall is common.

3. **Modified Leader system:**

- It is intermediate between the above two systems and has advantages of both systems.
- In this system, first, the tree is trained by a central leader system to develop the main trunk without any hindrance for the first four or five years.
- After that, it is cut at a height of 120 to 150 cm from the ground level.
- The first branch on the main stem is kept at a height of 40 cm from the ground and 4 to 5 branches are placed around the main stem at a distance of 15 to 20 cm.



Modified Leader System

Merits and demerits:

- It results in a small height tree with well-distributed branching, good fruiting due to well-branching distribution, and ease of operation of the orchard due to low height. This system of training is used in fruit plants like citrus, pear, apple

Pruning

- Pruning is the removal of unwanted, excess annual growth, dead, dry, and diseased wood from plants.
- It refers to the removal of plant parts such as bud, branch, root, etc. to strike a balance between vegetative growth and production.
- This can also be done to adjust the fruit load on the tree.

Objectives

1. To control the size and shape of the plant.
2. In order to make transplanting successful, pruning of leaves/twigs is done to create a balance between root and shoot and less water loss to the plants as compared to the limited root system lost during lifting.
3. Improving productivity and quality by regulating crop load and flowering.
4. Removal of non-productive vegetative growth such as water sprouts, suckers, dead and diseased wood.
5. Knotless timber production in forest trees.
6. Thinning the branches so that more light can enter the interior of the tree so that the inner branches also become fruitful.
7. Facilitating the shape of the top of the tree to make spraying easier and more cost-effective.
8. To regulate the spacing and distribution/direction of branches.
9. To prevent the spread of diseases.

Principles of Pruning

1. Remove the water sprouts.
2. To completely remove a shoot, it must be cut from the base.
3. Avoid injury to the bark when pruning. Always, branches of a greater diameter should be cut from the surface below.
4. Pruning should be done well before the flowering season.
5. In deciduous plants, pruning should be done before winter to reduce the damage caused by low temperatures.
6. To avoid diseases, apply Bordeaux paste after pruning.
7. Overcrowded, diseased, damaged and insect-infested twigs should be removed.

Plant responses to pruning

Plants' response to pruning must be well understood in order to successfully achieve the purpose of pruning. Following are some important responses that plants show to pruning.

1. **Activation of buds:** When a branch is cut, the buds below the cut of the branch become active. The bud near the cut is most vigorous and this power decreases in the bud as the distance from the cut increases. This is due to the elimination of the apical dominance of the terminal bud, which triggers the development of lateral buds.
2. **Dwarfing response:** The immediate effect of pruning is undoubtedly the invigoration of new branches due to the diversion of food, but due to the removal of too many leaves, there is a reduction in food formation resulting in stunted root growth which is responsible for the growth of new branches. limits further development. When the growth of new branches is reduced, their length also decreases. Therefore, the net effect of pruning a tree is dwarfed, proportional to the severity of the pruning. Along with the expansion of the top, the spread of the root system is reduced. This also causes dwarfism in the plant.

3. **Production of water shoots:** Intensive pruning often activates dormant buds or adventitious buds and may stimulate buds to develop on older branches. They often produce branches that grow vertically and very vigorously, with long internodes; The angular stems with large, succulent leaves and thorns (as in citrus) are called water shoots or water suckers or bull canes.
4. **Delay in bearing:** When intensive/ severe pruning is done especially in the early years of the fruit plant, fruiting is delayed. Sometimes intensive pruning can also lead to poor yields, as it destroys a great number of foliage and fruiting branches.

Methods of pruning

1. **Thinning out:** When a shoot is completely removed from the base (from the original location) so that no new shoots grow from that spot, it is called thinning out. This thinning is used to remove twigs, water sprouts, etc., growing at unwanted places.

   Selective and complete removal of part of the plant is termed thinning.

2. **Trimming:** Trimming the growth of twigs to a pre-determined level, as is done for fences, hedges, and edges.
3. **Heading back:** When branches grow long and vigorously without producing flowers, they are heading back. When a branch is cut almost to the base, leaving a few inches, it is called a heading back. The remaining buds on the stem will give rise to shoots that are important to the tree. These will either be fruiting branches or flower buds to fill gaps in the tree or form vegetative branches that can produce flowers the following year. The shoot of the bud closest to the cut replaces the cut shoot.
4. **Pollarding:** Pollarding is the cutting back of twigs, indiscriminately reducing the height of the tree.
5. **Girdling (Ringing):** In this process, a circular ring-shaped bark of about 3 cm in length is removed. Which accelerates flowering and fruiting by increasing the accumulation of stored food from photosynthesis in the upper part of the plant.
6. **Nicking:** Removing a wedge-shaped piece of bark and making a notch at the bottom of the bud is called nicking. This ensures the accumulation of carbohydrates from the leaves to the bud and can result in fruit bud formation.

7. **Pinching (tipping):** Pinching or tipping is the removal of the tip of a shoot to prevent plant indeterminate growth or to encourage the development of lateral buds. This is done in marigold and chilli at the time of transplanting.
8. **Disbudding (nipping or rubbing):** Nipping or robbing young buds to inhibit their growth. They are removed when the buds appear in the wrong places. Similarly, the sprouts (buds) on the rootstock are also disbudded.
9. **De-blossoming**: Removal of surplus flowers from the tree to produce fruit regularly year after year is called de-blossoming. It is used in alternate bearer trees like mango, apple, etc.

Seasons of pruning

1. It depends on the type of branch, type of plant species, and time of bud formation.
2. Water sprouts can be removed at any time of the year, along with removing diseased, dead, and dry wood.
3. Pruning of healthy branches should not be done when trees are flowering or bearing fruit, as the resulting disturbance destroys flowers or fruits.
4. In deciduous trees, pruning can be done before the end of dormancy.
5. In evergreen plants, pruning should be done before the start of active growth or post-harvest.
6. Summer pruning of deciduous trees and pruning of evergreens during the active growing season also delays the formation of flower buds by prolonging the time of vegetative growth.

Before pruning

A well-shaped plant
after pruning


THANK YOU