

Introduction to Horticulture

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Key concepts, main branches, and practical applications

1. What Is Horticulture?

Aspect	Description
Definition	The science and art of growing, cultivating, and managing plants for food, medicine, aesthetics, and environmental benefit.
Scope	Includes fruits, vegetables, ornamental plants, herbs, nuts, and turf.
Goal	Improve plant quality, yield, and sustainability while meeting human needs.
Relation to Agriculture	Horticulture is a subset of agriculture focused on high-value, often per-plant crops rather than bulk field crops (e.g., wheat, corn).

2. Major Sub-Disciplines

Sub-discipline	Primary Focus	Typical Crops/Plants
Pomology	Fruit production and post-harvest handling	Apples, mangoes, berries
Olericulture	Vegetable cultivation	Lettuce, tomatoes, carrots
Floriculture	Flowers and ornamental foliage	Roses, chrysanthemums, cut-greens
Landscape Horticulture	Design, installation, and maintenance of gardens, parks, and green spaces	Trees, shrubs, lawns
Viticulture	Grape growing for wine and fresh consumption	Vitis vinifera, hybrid grapes
Herbology	Culinary, medicinal, and aromatic plants	Basil, lavender, ginseng
Plant Propagation	Techniques to reproduce plants (seed, cutting, grafting, tissue culture)	All horticultural species

3. Core Principles

1. Plant Biology

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- Anatomy (roots, stems, leaves, reproductive organs)
- Physiology (photosynthesis, respiration, transpiration)
- Growth cycles (vegetative vs. reproductive phases)

2. Soil Science

- Physical properties: texture, structure, porosity
- Chemical properties: pH, nutrient availability (N?P?K, micronutrients)
- Biological activity: microbial communities, organic matter

3. Environmental Factors

- Light intensity & quality (photosynthetic photon flux)
- Temperature & humidity (optimal ranges differ by species)
- Water management (irrigation methods, drainage)

4. Integrated Pest Management (IPM)

- Monitoring & identification
- Cultural controls (crop rotation, sanitation)
- Biological controls (beneficial insects, microbes)
- Chemical controls (targeted, least?toxic pesticides)

5. Sustainable Practices

- Organic amendments (compost, biochar)
- Conservation tillage & mulching
- Water?use efficiency (drip irrigation, rainwater harvesting)
- Pollinator?friendly habitats

4. Plant Propagation Techniques

Technique	When Used	Key Steps
Seed sowing	Most annuals, many perennials	Select viable seed ? treat (stratify, scarify) ? sow in suitable medium ? maintain moisture & temperature
Stem cuttings	Woody and herbaceous plants	Cut healthy stem ? remove lower leaves ? dip in rooting hormone ? plant in moist medium

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Technique	When Used	Key Steps
Layering	Difficult to root woody species	Bend low branch to soil, wound, cover with soil ? roots develop ? sever and transplant
Grafting	Fruit trees, roses	Join scion (desired variety) to compatible rootstock ? secure with tape ? maintain humidity until union
Tissue culture (micropropagation)	Mass propagation of disease	