



Practical Manual

Basic Horticulture-I

for

(Class XI)



Central Board of Secondary Education
2, Community Centre, Preet Vihar, Delhi-110092

नया आगाज़

आज समय की माँग पर
आगाज़ नया इक होगा
निरंतर योग्यता के निर्णय से
परिणाम आकलन होगा।

परिवर्तन नियम जीवन का
नियम अब नया बनेगा
अब परिणामों के भय से
नहीं बालक कोई डरेगा
निरंतर योग्यता के निर्णय से
परिणाम आकलन होगा।

बदले शिक्षा का स्वरूप
नई खिले आशा की धूप
अब किसी कोमल-से मन पर
कोई बोझ न होगा

निरंतर योग्यता के निर्णय से
परिणाम आकलन होगा।
नई राह पर चलकर मंज़िल को हमें पाना है
इस नए प्रयास को हमने सफल बनाना है
बेहतर शिक्षा से बदले देश, ऐसे इसे अपनाए
शिक्षक, शिक्षा और शिक्षित
बस आगे बढ़ते जाएँ
बस आगे बढ़ते जाएँ
बस आगे बढ़ते जाएँ.....





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PREFACE

This practical manual entitled “**Basic Horticulture-I**” provides information on different aspects of horticultural crops viz. visit to a garden/orchard/vegetable farm, identification of major fruit crops, vegetable crops, flower crops, ornamental plants for avenues, lawn grasses, hedges and edges plants, indoor and outdoor foliage ornamentals, cacti and succulents and bulbous plants of the country, propagation of horticultural crops through seeds and asexual/vegetative methods, preparation of pot for planting, media preparation and filling, identification of different fertilizers and organic manures, and preparation of model of a low cost storage structure for horticultural crops. There are total twelve practicals in this book to impart practical knowledge to the students and will also help in their skill development. The manuscript gives an overview of basics of various horticultural crops, their identification, propagation techniques, different manures and fertilizers and low cost storage structures. Educational visits to gardens, orchards, vegetable farms, nurseries of horticultural plants and progressive growers of the region may be arranged for the students for better understanding of the subject.

Vineet Joshi, IAS
Chairman, CBSE

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भारत का संविधान

उद्देशिका

हम, भारत के लोग, भारत को एक ¹[संपूर्ण प्रभुत्व-संपन्न, समाजवादी, पंथ-निरपेक्ष, लोकतन्त्रात्मक गणराज्य] बनाने के लिए तथा उसके समस्त नागरिकों को:

सामाजिक, आर्थिक और राजनैतिक न्याय,

विचार, अभिव्यक्ति, विश्वास, धर्म और उपासना की स्वतंत्रता,

प्रतिष्ठा और अवसर की समता प्राप्त कराने के लिए,

तथा उन सबमें व्यक्ति की गरिमा और ²[राष्ट्र की एकता और अखंडता सुनिश्चित] करने वाली बंधुता बढ़ाने के लिए

दृढसंकल्प होकर अपनी इस संविधान सभा में आज तारीख 26 नवंबर, 1949 ई. (मिति मार्गशीर्ष शुक्ला सप्तमी, संवत् दो हजार छह विक्रमी) को एतद्वारा इस संविधान को अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।

भारत का संविधान

भाग 4क

नागरिकों के मूल कर्तव्य

अनुच्छेद 51क

मूल कर्तव्य- भारत के प्रत्येक नागरिक का यह कर्तव्य होगा कि वह -

- (क) संविधान का पालन करे और उसके आदर्शों, संस्थाओं, राष्ट्रध्वजों और राष्ट्रगान का आदर करे;
- (ख) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में संजोए रखे और उनका पालन करे;
- (ग) भारत की संप्रभुता, एकता और अखंडता की रक्षा करे और उसे अक्षुण्ण बनाए रखे;
- (घ) देश की रक्षा करे और आह्वान किए जाने पर राष्ट्र की सेवा करे;
- (ङ) भारत के सभी लोगों में समरसता और समान भ्रातृत्व की भावना का निर्माण करे जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभाव से परे हो, ऐसी प्रथाओं का त्याग करे जो महिलाओं के सम्मान के विरुद्ध हों;
- (च) हमारी सामासिक संस्कृति की गौरवशाली परंपरा का महत्व समझे और उसका परिरक्षण करे;
- (छ) प्राकृतिक पर्यावरण की, जिसके अंतर्गत वन, झील, नदी और वन्य जीव हैं, रक्षा करे और उसका संवर्धन करे तथा प्राणिमात्र के प्रति दयाभाव रखे;
- (ज) वैज्ञानिक दृष्टिकोण, मानववाद और ज्ञानार्जन तथा सुधार की भावना का विकास करे;
- (झ) सार्वजनिक संपत्ति को सुरक्षित रखे और हिंसा से दूर रहे;
- (ञ) व्यक्तिगत और सामूहिक गतिविधियों के सभी क्षेत्रों में उत्कर्ष की ओर बढ़ने का सतत प्रयास करे, जिससे राष्ट्र निरंतर बढ़ते हुए प्रयत्न और उपलब्धि की नई ऊँचाइयों को छू सके; और
- (ट) यदि माता-पिता या संरक्षक हैं, छह वर्ष से चौदह वर्ष तक की आयु वाले अपने, यथास्थिति, बालक या प्रतिपाल्य को शिक्षा के अवसर प्रदान करे।

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a '[**SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC**]' and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the ²[unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

1. Subs. by the Constitution (Forty-Second Amendment) Act. 1976, sec.2, for "Sovereign Democratic Republic (w.e.f. 3.1.1977)
2. Subs. by the Constitution (Forty-Second Amendment) Act. 1976, sec.2, for 'unity of the Nation (w.e.f. 3.1.1977)

THE CONSTITUTION OF INDIA

Chapter IV

A Fundamental Duties

ARTICLE 51 A

Fundamental Duties. It SHALL be the duty of every citizen of India

- (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
 - (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
 - (c) to uphold and protect the sovereignty, unity and integrity of India;
 - (d) to defend the country and render national service when called upon to do so;
 - (e) To promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
 - (f) to value and preserve the rich heritage of our composite culture;
 - (g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;
 - (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
 - (i) to safeguard public property and to abjure violence;
 - (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement.
- *(k) a parent or guardian to provide opportunities for education to his child or as the case may be ward between the age of six and fourteen years.

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Chapter No.	Name of the practical	Pages
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4.	Identification of major flower crops of our country	65-73
5.	Identification of ornamental plants for avenues and lawn- grasses, hedges, edges plants of our country	74-99
6.	Identification of indoor and outdoor foliage ornamentals, cacti-succulents and bulbous plants	100-120
7.	Propagation of horticultural crops through seeds	121-140
8.	Propagation through asexual methods-cuttings, layering, runners, suckers, grafting, and budding,	141-181
9.	Preparation of pot for planting, cleaning, media preparation and filling	182-186
10.	Identification of different fertilizers-NPK	187-190
11.	Identification of organic manures-FYM, vermicompost, cakes, bonemeal	191-195
12.	Preparation of model of a low cost storage structure for horticultural produce	196-200

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MM: 40

S. No.	Exercise	Marks	No. of sessions
1.	<ul style="list-style-type: none"> Visit to a garden Visit to an orchard Visit to a vegetable farm 	3	3
2.	<ul style="list-style-type: none"> Identification of major fruit crops of our country 	3	3
3.	<ul style="list-style-type: none"> Identification of major vegetable crops of our country 	3	3
4.	<ul style="list-style-type: none"> Identification of major flower crops of our country 	3	3
5.	<ul style="list-style-type: none"> Identification of ornamental plants for avenues and lawn- grasses, hedges, edges plants of our country 	3	4
6.	<ul style="list-style-type: none"> Identification of indoor and outdoor foliage ornamentals, cacti-succulents and bulbous plants 	4	3
7.	<ul style="list-style-type: none"> Propagation of vegetable crops through seeds Propagation of flower crops through seeds Propagation of fruit crops through seeds 	4	3
8.	<ul style="list-style-type: none"> Propagation through cuttings Propagation through layering (air and ground), runners and suckers Propagation through grafting Propagation through budding 	5	3
9.	<ul style="list-style-type: none"> Preparation of pot for planting, cleaning, media preparation and filling 	3	1
10.	<ul style="list-style-type: none"> Identification of different fertilizers-NPK 	3	2
11.	<ul style="list-style-type: none"> Identification of organic manures-FYM, vermicompost, cakes, bonemeal 	3	2
12.	<ul style="list-style-type: none"> Preparation of model of a low cost storage structure for horticultural produce 	3	2

MODULE OBJECTIVES

Sl. No.	Practical topic	Duration	Key Learning outcomes The students will be able to understand:
1.	Visit to a garden	2 hours	<ul style="list-style-type: none"> • Different styles of gardening • Ornamental plants for use in different gardens • Developing different features in garden
	Visit to an orchard	2 hours	<ul style="list-style-type: none"> • Features of an orchard • Different fruit crops grown in an orchard • Points to be remembered while establishing an orchard.
	Visit to a vegetable farm	2 hours	<ul style="list-style-type: none"> • Features of vegetable farm • Different vegetables crops grown in a vegetable garden • Cultivation practices adopted to grow vegetables
2.	Identification of major fruit crops of our country	6hours	<ul style="list-style-type: none"> • Different characteristic features of major fruit crops for their easy identification.
3.	Identification of major vegetable crops of our country	6 hours	<ul style="list-style-type: none"> • Different characteristic features of different vegetable crops for their easy identifications
4.	Identification of major flower crops of our country	6 hours	<ul style="list-style-type: none"> • Different cut and loose flower crops grown in India
5.	Identification of ornamental plants for avenues and lawn-grasses, hedges, edges plants of our country	8 hours	<ul style="list-style-type: none"> • Different ornamental trees and shrubs for avenues, lawn grasses, hedges and edges plants grown in India
6.	Identification of indoor and outdoor foliage ornamentals, cacti-succulents and bulbous plants	6 hours	<ul style="list-style-type: none"> • Various foliage/ house plants, cacti and succulents plants and bulbous flower crops based on primary morphological characters.

Sl. No.	Practical topic	Duration	Key Learning outcomes The students will be able to understand:
7.	Propagation of flower crops through seeds	2 hours	<ul style="list-style-type: none"> To raise the seedlings of ornamental annual flowers and plants To raise the new hybrids developed through crossing different ornamental plants To prepare ideal type of growing medium for seed sowing
	Propagation of vegetable crops through seeds	2 hours	<ul style="list-style-type: none"> Importance of nursery raising in vegetable crops Location for raising healthy seedlings Method for preparation of nursery seed bed Sowing methods for vegetable cultivation
	Propagation of fruit crops through seeds	2 hours	<ul style="list-style-type: none"> Importance of multiplication of fruit plants through seed Pre-sowing seed treatments to overcome dormancy Techniques of propagation of fruit plants and rootstocks through seed
8.	Propagation through asexual methods-cuttings, layering, runners, suckers, grafting and budding	6 hours	<ul style="list-style-type: none"> Basic techniques used in propagating horticultural plants through asexual methods To develop skill in the art of cuttings, layering, grafting and budding.

Sl. No.	Practical topic	Duration	Key Learning outcomes The students will be able to understand:
9.	Preparation of pot for planting, cleaning, media preparation and filling	2 hours	<ul style="list-style-type: none"> • Different types of pots/ containers used for growing ornamental plants • To prepare pots for planting of ornamental plants • To prepare soil based and soil-less growing medium • The procedure for potting, de-potting and re-potting of ornamental plants
10.	Identification of different fertilizers-NPK	4 hours	<ul style="list-style-type: none"> • The characteristic features of different fertilizers for their easy identification
11.	Identification of organic manures-FYM, vermicompost, cakes, bonemeal	4 hours	<ul style="list-style-type: none"> • The characteristic features of different organic manures for their easy identification
12.	Preparation of model of a low cost storage structure for horticultural produce	4 hours	<ul style="list-style-type: none"> • To prepare model of low cost storage structure for horticultural produce.

LEARNING PLAN

Exercise	Aims	Material required
1.	<ul style="list-style-type: none"> • To get acquainted with different styles and types of gardens developed • To get knowledge about different types of ornamental plants used in different gardens. • Acquaintance with features of an orchard and different aspects of orchard establishment. 	<p>Paper sheet and pen to note down the instructions, transport facility for visiting different gardens.</p> <p>Paper sheet and pen to note down the instructions and pictures of different fruit plants.</p>

Exercise	Aims	Material required
	<ul style="list-style-type: none"> Acquaintance with different aspects of vegetable farm, raising of different vegetables, their cultural practices and identification 	Paper sheet and pen to note down the instructions, forceps, hand lens, and pictures of different vegetables.
2.	<ul style="list-style-type: none"> Imparting knowledge for the identification of major fruit crops on the basis of different morphological characters at different plant growth stages 	Paper sheet, pen to note down the instructions, forceps, hand lens and pictures of different fruit crops.
3.	<ul style="list-style-type: none"> Imparting knowledge for the identification of different vegetable crops on the basis of different morphological characters at different plant growth stage 	Paper sheet, pen to note down the instructions, forceps, hand lens and pictures of different vegetables.
4.	<ul style="list-style-type: none"> To identify various cut and loose flower crops based on primary morphological characters. 	Paper sheet, pen to note down the instructions, flower crops, hand lens and standard encyclopedia and books on Floriculture
5.	<ul style="list-style-type: none"> To demonstrate different ornamental trees and shrubs for avenues, lawn grasses, hedges and edges plants grown in India 	Paper sheet, pen to note down the instructions, ornamental trees and shrubs for avenues, lawn grasses, hedges and edges plants, hand lens and standard encyclopedia and books on Floriculture
6.	<ul style="list-style-type: none"> To identify various foliage/ house plants, cacti and succulents and bulbous flower crops based on primary morphological characters. 	Paper sheet, pen to note down the instructions, foliage/house plants, hand lens and standard encyclopedia and books on Floriculture
7.	<ul style="list-style-type: none"> To recognize the importance and methodology to raise healthy seedlings of ornamental flowers and plants. 	Spade, Khutti, Hand shovel, soil leveler, measuring tape, rope, watering can with fine rose head, leaf mould/ FYM, SSP, sand, soil disinfectant chemical, black

Exercise	Aims	Material required
		polythene/ tarpaulin, fungicide (Bavistin/ Dithane- M. 45/ Captan/ Ridomil), insecticide (Fenvalerate dust/ chloropyriphos), seed material, dry grass/ thatch, flexible stick, transparent polythene sheet, etc.
	<ul style="list-style-type: none"> To impart knowledge of innovative nursery raising techniques and growing of direct seeded crops 	Paper sheet and pen to note down the instructions, different tools for land preparation, farmyard manure, fertilizers, seeds of vegetable crop, bavistin, herbicide, etc.
	<ul style="list-style-type: none"> To multiply those fruit plants through seed, that can not be multiplied by other means of propagation 	Paper sheet and pen to note down the instructions, different tools for land preparation, farmyard manure, fertilizers, seeds of fruit plants, File, wooden boxes, tin boxes, plastic containers, refrigerator, sterilized sand, sphagnum moss, mercuric chloride, gibberellins, thiourea, sulphuric acid, labels, hammer, nut cracker, bavistin, herbicide, etc.
	<ul style="list-style-type: none"> To raise rootstocks for various grafting/budding purposes 	
	<ul style="list-style-type: none"> To overcome seed germination barriers such as hard seed coat, dormancy 	
8.	<ul style="list-style-type: none"> Basic techniques used in propagating horticultural plants through asexual methods To develop skill in the art of cuttings, layering, grafting and budding. 	Appropriate plant material, Propagation media, Secateur and grafting/budding knives, Labels and marking pens. Rooting hormones (IBA, NAA), and Tying material (polythene sheet-150gauge/ paraffin wax etc.)
9.	<ul style="list-style-type: none"> To recognize the importance of preparing pot for potting and repotting To understand the steps for preparing ideal growing media for plants growing in pots/ containers 	Soil (Clay/ Loam/ Sandy loam), FYM, Leaf mould, Sand, Peat moss, Perlite, Vermiculite, Lime, Gypsum, inorganic fertilizers, etc. Containers (Pots), crocks (broken pieces of pots), pebbles, coarse sand, growing

Exercise	Aims	Material required
		medium, plant material (seed/ bulb/ seedling/ sapling), secateur, pruning knife, hand trowel, dibbler, Khutti, watering can, fungicide and insecticide
10.	<ul style="list-style-type: none"> The characteristic features of different fertilizers for their easy identification 	Paper sheet and pen to note down the instructions, samples of fertilizers, petri-dishes etc
11.	<ul style="list-style-type: none"> The characteristic features of different manures for their easy identification 	Paper sheet and pen to note down the instructions, samples of manures, petri-dishes etc
12.	<ul style="list-style-type: none"> To study the principle and working of low cost structures for storage of fruits and vegetables. To prepare model of low cost storage structure for horticultural produce. 	<ul style="list-style-type: none"> Locally available materials like bricks, sand, bamboo, khaskhas/ straw, gunny bags, etc., with a source of water.