

PRACTICAL MANUAL

OLERICULTURE-I

for

Class XI



CENTRAL BOARD OF SECONDARY EDUCATION

2, COMMUNITY CENTRE, PREET VIHAR, DELHI – 110092

Practical Manual

Olericulture-I for Class XI

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PREFACE

Vegetable crops are the rich source of various health building substances especially vitamins and minerals and offer an advantage for food and nutritional security. Besides, their high yield potential per unit area and time, diverse varietal wealth, labour intensiveness, high market price and prospects of processing, value addition and export, they play an important role in employment generation and livelihood improvement. India has been bestowed with varied agro-climatic conditions ranging from sub-tropical to temperate, serving as an off-season hub for production of quality vegetables in one or the other region through out the year.

This practical manual on “**Olericulture-I**” provides information on different aspects of vegetable production *viz.*, identification of vegetable crops, different inputs used in raising vegetable crops including tools and implements and procedures involved in nursery raising and vegetable production right from land preparation to harvesting (both green and seed production) along with off-season vegetable production under extremes of environmental conditions. There are 20 practicals in this book to impart practical knowledge to the students. The students have been provided with exercises and data sheets to have a practical insight of the subject. The educational visits to vegetable gardens and seed production farms may be arranged for the students to inculcate practical skills and better understanding of the subject. The information to be gathered from the visits has been appended in the respective exercises. This practical manual is an effort to sensitize the students about practical aspects of vegetable production and will motivate them to choose vegetable production as an enterprise.

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भारत का संविधान

उद्देशिका

हम, भारत के लोग, भारत को एक सम्पूर्ण 'प्रभुत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक 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 सब में व्यक्ति की गरिमा

²और राष्ट्र की एकता और अखंडता

सुनिश्चित करने वाली बंधुता बढ़ाने के लिए

दृढ़संकल्प होकर अपनी इस संविधान सभा में आज तारीख 26 नवम्बर, 1949 ई० को एतद्वारा इस संविधान को अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।

1. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977) से “प्रभुत्व-संपन्न लोकतंत्रात्मक गणराज्य” के स्थान पर प्रतिस्थापित।
2. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977) से “राष्ट्र की एकता” के स्थान पर प्रतिस्थापित।

भाग 4 क

मूल कर्तव्य

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

- (क) संविधान का पालन करे और उसके आदर्शों, संस्थाओं, राष्ट्रध्वज 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 प्रभुता, एकता और अखंडता की रक्षा करे और उसे अक्षुण्ण 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 हों, ऐसी प्रथाओं का त्याग करे जो स्त्रियों के सम्मान के विरुद्ध हैं;
- (च) हमारी सामासिक संस्कृति की गौरवशाली परंपरा का महत्त्व 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 उंचाइयों को छू ले;
- ¹(ट) यदि माता-पिता या संरक्षक है, छह वर्ष से चौदह वर्ष तक की आयु वाले अपने, यथास्थिति, बालक या प्रतिपाल्य के लिये शिक्षा के अवसर प्रदान करे।

1. संविधान (छयासीवां संशोधन) अधिनियम, 2002 द्वारा प्रतिस्थापित।

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a ¹**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 the² 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 51A

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;
- ¹(k) to provide opportunities for education to his/her child or, as the case may be, ward between age of 6 and 14 years.

1. Subs, by the Constitution (Eighty-Sixth Amendment) Act. 2002.

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PRACTICAL MANUAL OLERICULTURE- I

Time: 3 hours

MM: 40

S. No.	Exercise	Marks	No. of Sessions
1.	- Visit to a vegetable garden to study its features and to know about various agronomic practices followed to raise vegetable crops. - Identification of vegetable crops with reference to stage of crop growth, flowering and marketable stage of the vegetables	3	3
2.	Preparation of land for vegetable cultivation and sowing of vegetable crops	2	2
3.	Preparation of nursery beds for raising healthy seedlings of different vegetable crops	2	2
4.	Visit to a local vegetable nursery and acquaintance with nursery management practices	2	2
5.	- Identification of solanaceous, leafy, legume, root, bulb, cole and cucurbit vegetable crops by visiting vegetable gardens in different seasons. - Identification of seedlings of different vegetable crops in the nursery	2	2
6.	Identification of seeds of different vegetable crops	2	1
7.	Calculation of quantity of seed required for sowing French bean, okra and turnip in 1000 m² area	2	1
8.	- Protection of vegetable plants from low temperature to produce early crop. - Protection of vegetable plants from high temperature	2	2
9.	- To Study the irrigation methods used in cultivation of vegetable crops - To study the effect of water logging on vegetable crops and the methods of drainage in crop production	2	2
10.	Identification of organic manures and chemical fertilizers	2	1

11.	● Calculation of fertilizer doses for various vegetable crops as per recommendation of N, P and K	2	1
12.	● Identification of symptoms caused by nutrient deficiency in vegetable crops	2	1
13.	● Identification of common weeds in vegetable gardens ● Preparation of herbarium of different weed plants growing in vegetable gardens	2	2
14.	● Use of herbicides and manual weeding methods to control weeds in vegetable crops	2	2
15.	● Identification of different kinds of mulches ● Method of application of mulches in vegetable crops	2	1
16.	● Methods of training and pruning in tomato ● Methods of training and pruning in cucumber	2	2
17.	● Preparation of stecklings by raising mother roots of carrot, radish and turnip ● Planting of stecklings for seed production of root vegetables	2	1
18.	● Raising crop of cucurbits for quality seed production ● Method of seed extraction in cucurbits and maintaining seed standards	2	2
19.	● Visiting local market to identify different vegetable crops on the basis of plant part consumed	2	2
20.	● Identification of common tools used manually for land preparation and intercultural operations for the cultivation of vegetable crops ● Identification of large implements used for land preparation and seeding of vegetable crops ● Identification of plant protection equipments used for controlling vegetable pests ● Identification of implements used for harvesting of vegetable crops	1	1

MODULE OBJECTIVES

S. No.	Practical topic	Duration	Key learning outcomes The students will be able to understand:
1.	Visiting vegetable gardens, identification of vegetable crops with reference to stage of crop growth, flowering and marketable stage of the vegetables	6 hours	● To know about different vegetables crops grown in a vegetable garden ● Cultivation practices adopted to grow vegetables ● Identification of different vegetable crops on the basis of different morphological characteristics
2.	Land preparation and sowing of vegetable crops	4 hours	● Importance of land preparation in vegetable cultivation ● Method of land preparation ● Sowing methods for different vegetables
3.	Preparation of nursery beds for raising vegetable seedlings	4 hours	● Principles to grow nursery of vegetable seedlings ● Preparation of nursery beds and raising of quality seedlings
4.	Visit to a local vegetable nursery and acquaintance with nursery management practices	4 hours	● Features of model vegetable nursery ● Methods of selection of quality planting material, packaging and transportation
5.	Identification of important vegetable crops at different growth stages on the basis of different morphological traits	4 hours	● Knowing the major characteristic features of different vegetable crops for their easy identification
6.	Identification of seeds of vegetable crops	4 hours	● Identification of seeds of different summer and winter season vegetables on the basis of shape, size, colour <i>etc.</i>

7.	Calculation of seed requirement for important vegetable crops	4 hours	● Learning the estimation of quantity of seed requirement for a unit area on the basis of germination percentage and test weight of seed.
8.	Protecting plants from sub-optimal temperature conditions to cultivate off-season vegetables	4 hours	● Technologies for raising off-season vegetable cultivation under low and high temperature conditions
9.	Methods of irrigation and drainage for the cultivation of vegetable crops	4 hours	● Irrigation methods for vegetable cultivation ● Importance of drainage in vegetable cultivation and methods of drainage ● Effect of water logging on vegetables
10.	Identification of organic manures and chemical fertilizers	4 hours	● Ability to identify different organic manures and synthetic fertilizers
11.	Calculation of the doses of fertilizers as per the recommendation for a particular vegetable crop	4 hours	● Estimation of quantity of synthetic fertilizers based on recommended doses of NPK nutrients for different vegetables and their schedule of application
12.	Identification of deficiency symptoms of nutrients in vegetable crops	4 hours	● Effects of nutrient deficiencies on vegetable crops ● Identification of symptoms of nutrient deficiencies in vegetable crops
13.	Identification of common weeds in vegetable gardens and preparation of herbarium	4 hours	● Principles to identify different weeds ● Preparation of weed herbarium
14.	Controlling weeds in gardens through manual and chemical methods	4 hours	● Importance of weed control ● Different methods of weed control in vegetable crops
15.	Identification of different types of mulches and their application in vegetable crops	4 hours	● Effect of mulches on crop production and identification of different kinds of mulches ● Time and method of application of mulches in vegetable crops

16.	Methods of training and pruning of tomato and cucumber crop	4 hours	● Effect of training and pruning in tomato and cucumber growth ● Different methods of training and pruning in these crops
17.	Preparation of stecklings of root vegetables and their planting for seed production	4 hours	● Raising mother roots for seed crop of root vegetable crops ● Preparation of stecklings and their planting for seed production of root vegetables
18.	Seed production technology of cucurbits	4 hours	● Principles to be followed for quality seed production of cucurbits ● Extraction of seed from fruits of cucurbits
19.	Visit to local market for identification of vegetable crops	4 hours	● Identification of vegetables based on economic part used for sale in the market
20.	Identification of common tools and equipments used for the cultivation of vegetable crops	2 hours	● Identification of different tools and equipments used for vegetable cultivation ● Functions and applications of different tools and implements

LEARNING PLAN

Experiment	Aims	Material required
1	- To study the features of an ideal vegetable garden - Acquaintance with different vegetable crops growing in a vegetable garden, their cultural practices and identification	Paper sheet and pen to note down the instructions, forceps, hand lens, and pictures of different vegetables.
2	Hands on training for the preparation of land for cultivation of vegetable crops	Paper sheet and pen to note down the instructions, different tools for land preparation, farmyard manure, fertilizers, seed, bavistin, herbicide <i>etc.</i>
3	To impart knowledge of innovative nursery raising technique for different vegetable crops for raising quality and disease free seedlings	Paper sheet and pen to note down the instructions, different tools for land preparation, farmyard manure, fertilizers, seeds of vegetable crop <i>etc.</i>
4	Imparting knowledge of innovative nursery raising and management practices by visiting a local nursery	Paper sheet and pen to note down the instructions/ information
5	Imparting knowledge for the identification of vegetable crops at different plant growth stages on the basis of morphological characters	Forceps, hand lens, paper sheet, paper and pen to note down the instructions and pictures of different vegetables.
6	To impart knowledge of prominent characteristics to identify seeds of different vegetable crops	Paper sheet and pen to note down the instructions, seed samples of vegetable crops, petri-dishes, hand lens <i>etc.</i>
7	To calculate the quantity of seed required for sowing a unit area for different vegetable crops	Paper sheet and pen to note down the steps <i>etc.</i>
8	Imparting training to raise vegetable crops in the off-season by protecting from low as well as high temperature	Paper sheet and pen to note down the steps, organic mulch, plastic sheets, smudge pot, shading nets <i>etc.</i>

9	● Acquaintance with different irrigation methods used in vegetable production ● To know the effect of water stagnation on vegetable crops and drainage methods	Paper sheet and pen to note down the steps, spade, drip system, sprinkler irrigation system <i>etc.</i>
10	● To impart knowledge to identify organic manures, biofertilizers and chemical fertilizers used in vegetable production	Paper sheet and pen to note down the instructions, samples of manures and fertilizers, petri-dishes <i>etc.</i>
11	● To learn the calculation of doses of fertilizers based on the recommendation of N, P and K for a particular vegetable crop	Paper sheet and pen to note down the calculation procedure
12	● Identification of deficiency symptoms of nutrients in vegetable crops	Paper sheet and pen to note down the instruction, hand lens <i>etc.</i>
13	● Identification of common weeds of vegetable crops on the basis of different growth parameters and morphological attributes ● Preparation of herbarium of different weed plants for their identification during off-season	Paper sheet and pen to note down the instructions, hand lens, Blotting paper sheets/old newspapers, herbarium press, secateurs, scalpel, herbarium sheet, cello tape, pencil
14	● To control weeds by using herbicides and manual weeding in vegetable crops	Paper sheet and pen to note down the instruction, hand hoe, herbicide, spray pump, stop watch, measuring tape <i>etc.</i>
15	● Identification of different mulches and their importance in vegetable production ● Application of organic and synthetic mulches to conserve moisture, weed control and modifying soil temperature	Paper sheet and pen to note down the instruction, organic mulch, plastic mulch <i>etc.</i>
16	● Hands on training and pruning in tomato and cucumber	Paper sheet and pen to note down the instruction, secateurs, bamboo/any other stakes, polypropylene twine, wire <i>etc.</i>

17	● Preparation of root stecklings for quality seed production of root vegetables	Paper sheet and pen to note down the instructions, root vegetable, knife, digging hoe <i>etc.</i>
18	● Quality seed production of cucurbitaceous vegetables	Paper sheet and pen to note down the instructions, seed and other inputs to raise the crop including staking material.
19	● To visit a local market to identify different vegetable crops on the basis of their economic plant parts	Paper sheet, pen to note down the instructions, pictures and fresh samples of vegetables
20	● Acquaintance with different tools and equipments along with their use in vegetable production	Paper sheet and pen to note down the instructions, different tools and equipments.