

T. Y. B. Sc.

**NEW SYLLABUS
CBCS PATTERN**

SEMESTER-VI

PLANT BREEDING AND SEED TECHNOLOGY

BOTANY (BO-366) : PAPER-VI

Dr. K. N. DHUMAL

Dr. A. M. BHOSALE

Dr. S. N. BOLBHAT

Dr. N. B. ADMUTHE

Dr. K. N. PALGHADMAL

CBCS
2 CREDITS



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SPPU New Syllabus

A Text Book Of

PLANT BREEDING AND SEED TECHNOLOGY

for

Third Year B.Sc. Botany

Paper - VI [BO - 366] [2 Credits], Semester - VI

New Syllabus as per CBCS Pattern, with Effect from July 2021

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Food for Thoughts

"Pretty much every plant and animal today is the result of eons of natural cross breeding".

- Neil DeGrasse Tyson

"The secret of improved plant breeding, apart from scientific knowledge is Love".

- Luther Burbank

"I have seen first-hand that agricultural science has enormous potential to increase the yields of small farmers and lift them out of hunger and poverty".

- Bill Gate

"The world's bread depends on the shooting of a seed".

- Hugh Miller

"The day you plant the seed is not the day you eat the fruit".



Preface ...

This book on Plant Breeding and Seed Technology for T.Y.B.Sc. Botany, Semester VI, Paper-VI, BO : 366 (For two credits) has been written as per new syllabus, CBCS pattern, implemented by Savitribai Phule Pune University (SPPU) from the Academic year 2021.

The Phenomenal growth in Agriculture is largely due to Plant Breeding and Seed Technology development along with other branches. In recent years, many novel methods have been used in agriculture out of them plant breeding and seed technology is included in B. Sc. Botany Syllabus as it is more concern to Botany. Considering the importance of this subject very senior, experienced and highly qualified teachers have contributed their best in writing of this book.

All the topics such as;

- (1) Introduction to Plant Breeding,
- (2) Techniques and Practices of Plant Breeding,
- (3) Advanced Techniques in Plant Breeding,
- (4) Introduction to Seed Technology,
- (5) Seed Legislation,
- (6) Seed Production,
- (7) Seed Certification,
- (8) Seed Testing,
- (9) Seed Pathology and Entomology,
- (10) Seed Storage.

are written in full depth, with maximum figures, tables and illustrations. As a result of this, the book has become very interesting and readable for all those who are interested in Plant Breeding and Seed Technology. It has become very useful to Botany as well as agriculture students.

All the reference books, research papers, websites, referred are duly acknowledged and listed in References. Each chapter of this book is having points to remember (summary) and exercise for practice of the students. At the end of the book Glossary of the terms used, while writing, is enclosed to help the students; which will be enormously benefit the students and teachers also.

We hope that our students, teachers and any one who is interested to learn about Plant Breeding and Seed Technology will highly appreciate our sincere efforts. We thank to the students and whole academic community for giving overwhelming response to our sem. V books for different subjects including skill development books.

Mr. Aditya and Miss. Aditi Deshmukh from Baramati (Dist. Pune) are specially acknowledged for their help in making the wonderful cover design of this book.

Our special thanks to the complete team of Nirali Prakashan and their Mentor, team manager Mr. Jignesh Furia for their efforts and efficiency to bringing this book in time, inspite of the very hardtime of COVID-19.

We always welcome positive and constructive suggestions from our readers, well wishers to bring further improvement in this book in next edition.

Authors

Syllabus ...

Total lectures: 30

Credit-I : Plant Breeding

15 L

1. **Introduction:** Definition, Scope and Objectives and History of Plant Breeding in India. 01 L
2. **Techniques and Practices of Plant Breeding**
 - (A) **Plant Introduction** 02 L
 - Definition
 - Types (Primary and Secondary)
 - Procedure
 - Merits and Demerits
 - Important Achievements
 - (B) **Selection Methods** 03 L
 - Concept
 - Types of Selections: Mass Selection, Pure line selection and Clonal Selection
 - Advantages and disadvantages of selection
 - Achievements of selection breeding
 - (C) **Hybridization** 04 L
 - Definition, Concept and Objectives
 - Precaution to be taken during hybridization
 - Types: Intervarietal and Distant
 - General procedure of hybridization
 - Methods of hybridization: Pdigree and bulk
 - Hybrid vigour and hetrosis
3. **Advanced Techniques in Plant Breeding**
 - (A) **Mutation breeding** 03 L
 - Definition and concept
 - Mutagens (Physical and Chemical)
 - Mutants
 - Types of mutation (Spontaneous and Induced)
 - Applications of mutation breeding
 - Limitations of mutation breeding
 - (B) **Tissue Culture** 02 L
 - Definition and concept
 - Totipotency
 - Application of tissue, embryo and anther culture in seed production

Credit-II : Seed Technology**15 L****4. Introduction to Seed Technology****02 L**

- Seed as a basic input in agriculture
- Classes of seed
 1. Nucleus
 2. Breeder
 3. Foundation
 4. Certified

Role of seed technology

5. Seed legislation**01 L**

- Introduction
- Seed legislation in India (Seed Act)

6. Seed Production**03 L**

- Introduction
- National Seed Corporation (NSC) and its objectives
- State Seed Corporation (SSC) and its objectives
- General procedure for Seed Production
 - Location and Season
 - Land requirement
 - Importance of soil and water testing
 - Cultural practices
 - Isolation distance
 - Plant protection
 - Weed Control
 - Rouging
 - Harvesting
 - Threshing
 - Seed Processing

7. Seed Certification**02 L**

- Definition, Objectives and Concept
- Phases of Seed Certification
- General procedure of seed certification
- Field inspection
- Duties of seed inspector

8. Seed Testing**03 L****(A) Physical Purity Analysis**

- Definition of purity components

- Physical Purity Work Board
- Procedure

(B) Moisture Testing

- Concept
- Air oven method
- Digital Moisture Meter

(C) Germination testing

- Definition and objectives
- Procedure and methods for germination testing (Paper, Sand and Soil)
- Seedling evaluation (Normal Seedlings, Abnormal Seedlings, Multigerm Seed Units and Non-germinated Seeds)

9. Seed Pathology and Entomology

02 L

- Definition
- Seed Borne pathogens
 - Fungi
 - Bacteria
 - Viruses
- Influence of seed borne pathogens on seed production
- Common insect pest and its impact on seed production

10. Seed Storage

02 L

- Definition and Concept
- Seed treatment
- Management of seed storage structures
 - Sanitization
 - Dehumidification
 - Fumigation



Contents ...

Credit - I

- | | |
|--|-------------------|
| 1. Introduction to Plant Breeding | 1.1 - 1.10 |
| 2. Techniques and Practices of Plant Breeding | 2.1 - 2.28 |
| 3. Advanced Techniques in Plant Breeding | 3.1 - 3.26 |

Credit - II

- | | |
|---|--------------------|
| 4. Introduction to Seed Technology | 4.1 - 4.8 |
| 5. Seed Legislation | 5.1 - 5.10 |
| 6. Seed Production | 6.1 - 6.9 |
| 7. Seed Certification | 7.1 - 7.10 |
| 8. Seed Testing | 8.1 - 8.16 |
| 9. Seed Pathology and Entomology | 9.1 - 9.8 |
| 10. Seed Storage | 10.1 - 10.8 |
| Glossary | G.1 - G.8 |
| References | R.1 - R.1 |



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