DEPARTMENT OF AGRICULTURAL BOTANY

POST GRADUATE INSTITUTE • MAHATMA PHULE KRISHI VIDYAPEETH, RAHURI413 722, DIST. AHILYANAGAR (MAHARASHTRA)

1. Preamble & Core Disciplines

The Department of Agricultural Botany has a rich legacy of outstanding contributions to agricultural education, research, and extension since its establishment. It has played a pivotal role in transforming Indian agriculture from a state of food scarcity and dependence on food imports prior to the 1960s to self-sufficiency in food production through the Green Revolution. The department has made significant contributions to crop improvement, which has been instrumental in enhancing agricultural productivity and ensuring food security for the growing population.

Crop improvement through the development of high-yielding varieties and hybrids forms the backbone of agricultural progress, and the department has consistently contributed to this endeavour. The department encompasses four major disciplines—each actively engaged in teaching, research, and extension education:

01 | Genetics and Plant Breeding Development of high-yielding, climate-resilient crop varieties and hybrids.	**02 | Plant Physiology** Understanding crop growth, stress tolerance, and physiological efficiency.
03 | Seed Science and Technology Advancing quality seed production, testing, processing, and storage technologies.	**04 | Molecular Biology and Biotechnology** Integrating modern genomic and biotechnological tools with conventional breeding.

To address emerging challenges in agriculture and advance scientific research in the twenty-first century, the department has further strengthened its research infrastructure through the establishment of a well-equipped State Level Biotechnology Centre. The department continues to strive for scientific excellence, innovation, and sustainable agricultural development through the integration of conventional breeding approaches with modern biotechnological tools.

2. Departmental Mandates

No.	Mandate Area	Scope & Objective
01	**Undergraduate Education**	To offer courses in Agricultural Botany for the undergraduate degree programmes in the Faculty of Agriculture.
02	**Postgraduate & Doctoral Programmes**	To offer specialized courses in Agricultural Botany for M.Sc. (Agri.) and Ph.D. degree programmes in Genetics and Plant Breeding, Plant Physiology, Seed Science & Technology, and Molecular Biology & Biotechnology.
03	**Strategic & Applied Research**	To undertake basic, strategic, and applied research programmes through postgraduate students in the department.
04	**Crop Improvement Planning**	To plan and execute crop improvement programmes aimed at increasing agricultural productivity and strengthening the foundational concepts of Agricultural Botany.

No.	Mandate Area	Scope & Objective
05	**Scientific Exchange & Conferences**	To organize seminars, symposia, and conferences for the dissemination and exchange of scientific information.
06	**Extension & Technology Transfer**	To cater to the technological needs of State Agriculture Departments regarding the transfer of advanced technologies, improved crop varieties, and quality seed production and distribution through training programmes, All India Radio (AIR) and television broadcasts, farmers' rallies, field demonstrations, and published literature.

3. Faculty Directory

Sr. No.	Name	Designation	Specialization	Publications
01	**Dr. S. S. Dodake**	Professor & I/c Head	Genetics and Plant Breeding, Pulses Breeding	Google Scholar
02	**Dr. V. L. Amolic**	Professor	Genetics and Plant Breeding, Sorghum Breeding	Google Scholar
03	**Dr. V. P. Chimote**	Professor	Molecular Biology and Biotechnology, Genetics and Plant Breeding	Google Scholar
04	**Dr. P. K. Kulwal**	Professor	Genetics and Plant Breeding, Molecular Biology, Cotton Breeding	Google Scholar
05	**Dr. M. T. Bhingarde**	Associate Professor	Seed Science and Technology	Google Scholar
06	**Dr. K. D. Bhoite**	Associate Professor	Genetics and Plant Breeding, Forage Breeding	Google Scholar
07	**Dr. V. R. Awari**	Assistant Professor	Sorghum Physiology and Breeding	Google Scholar
08	**Dr. D. N. Damse**	Assistant Professor	Molecular Biology and Biotechnology, Genetics and Plant Breeding	Google Scholar
09	**Dr. K. C. Gagare**	Assistant Professor	Seed Science and Technology	Google Scholar
10	**Dr. A. R. Aher**	Assistant Professor	Molecular Biology, Genetics and Plant Breeding, Jute Breeding	Google Scholar
11	**Dr. V. M. Jambhale**	Assistant Professor	Genetics and Plant Breeding, Agroforestry	Google Scholar
12	**Dr. V. B. Shinde**	Assistant Professor	Genetics and Plant Breeding, Sorghum Breeding, Grass Breeding	------
13	**Dr. D. S. Thakare**	Assistant Professor	Genetics and Plant Breeding, Maize Breeding	Google Scholar
14	**Dr. A. P. Karjule**	Assistant Professor	Seed Science and Technology	Google Scholar

4. Academic Programmes & Intake Capacity

4.1 Annual Intake Capacity of Postgraduate (P.G.) Students

Location / Constituent College	Genetics & Plant Breeding	Plant Physiology	Seed Science & Tech.	Mol. Biology & Biotech.	Total
A) M.Sc. (Agri.) Degree Programmes					
Post Graduate Institute, Rahuri	15	5	5	8	**33**
College of Agriculture, Pune	6	—	—	—	**6**
College of Agriculture, Dhule	4	—	—	—	**4**
College of Agriculture, Kolhapur	6	—	—	—	**6**
B) Ph.D. Degree Programmes					
Post Graduate Institute (P.G.I.), Rahuri	6	—	2	—	**8**

4.2 Number of Courses and Course Credits for Teaching

Programme / Discipline	No. of Courses	Course Credits
Undergraduate Programmes		
a. B.Sc. (Agri.)	9	23
b. B.Sc. (Horti.)	2	5
Postgraduate Programmes — M.Sc. (Agri.)		
i. Genetics and Plant Breeding	7	20
ii. Plant Physiology	7	20
iii. Seed Science & Technology	8	20
iv. Molecular Biology and Biotechnology*	7	21
Doctoral Programmes — Ph.D.		
i. Genetics and Plant Breeding	7	16
ii. Plant Physiology	11	25
iii. Seed Science & Technology	7	16

5. Minimum Credit Requirements & Semester-Wise Course Layouts

[M.Sc. (Agri.) PROGRAMME] 5.1 Genetics and Plant Breeding

Sr. No.	Subject / Course Category	Minimum Credit(s)
01	**Major**	20
02	**Minor**	09
03	**Supporting**	07
04	**Seminar**	01
05	**Research**	30
—	**Total Credits**	**72**
—	**Compulsory Non-Credit Courses**	**05**

Course No.	Course Title & Category	Credits
SEMESTER I | Major: 9 • Minor: 6 • Supporting: 4 • NCCC: 2 • Research: 5		
GPB-501*	Principles of Genetics (Major)	3 (2+1)
GPB-502*	Principles of Plant Breeding (Major)	3 (2+1)
GPB-505	Principles of Cytogenetics (Major)	3 (2+1)
MBB-501	Principles of Biotechnology (Minor)	3 (3+0)
PP-501	Principles of Plant Physiology-I: Plant Water Relation and Nutrition Management (Minor)	3 (2+1)
BIOCHEM-501	Basic Biochemistry (Supporting)	4 (3+1)
PGS-501	Library and Information Services (NCCC)	1 (0+1)
PGS-504	Basic Concepts in Laboratory Techniques (NCCC)	1 (0+1)
GPB-599	Research Work	5 (0+5)
Subtotal	**Semester I Credit Load (Major 9 + Minor 6 + Supporting 4) + Research 5 + NCCC 2**	**19 (+5 Res)**
SEMESTER II | Major: 9 • Minor: 3 • Supporting: 3 • NCCC: 2 • Research: 5		
GPB-503*	Fundamentals of Quantitative Genetics (Major)	3 (2+1)
GPB-506*	Molecular Breeding and Bioinformatics (Major)	3 (2+1)
GPB-516	Breeding for Stress Resistance and Climate Change (Major)	3 (2+1)
SST-507	Seed Legislation and Certification (Minor)	3 (2+1)

Course No.	Course Title & Category	Credits
STAT-511	Experimental Design (Supporting)	3 (2+1)
PGS-502	Technical Writing and Communication Skills (NCCC)	1 (0+1)
PGS-503	Intellectual Property and its Management in Agriculture (NCCC)	1 (1+0)
GPB-599	Research Work	5 (0+5)
Subtotal	**Semester II Credit Load (Major 9 + Minor 3 + Supporting 3) + Research 5 + NCCC 2**	**15 (+5 Res)**
SEMESTER III | Major: 2 • Seminar: 1 • NCCC: 1 • Research: 10		
GPB-504	Varietal Development and Maintenance Breeding (Major)	2 (1+1)
GPB-591	Master Seminar (Seminar)	1 (0+1)
PGS-505	Agricultural Research, Research Ethics and Rural Development Programmes (NCCC)	1 (1+0)
GPB-599	Research Work	10 (0+10)
Subtotal	**Semester III Credit Load (Major 2 + Seminar 1) + Research 10 + NCCC 1**	**3 (+10 Res)**
SEMESTER IV | Research Work: 10		
GPB-599	Research Work	10 (0+10)
Grand Total	**Total Coursework (20 + 9 + 7 + 1 = 37) + Research (30) + NCCC (5)**	**72 Credits**

** Compulsory Course*

[Ph.D. PROGRAMME] 5.2 Genetics and Plant Breeding

Sr. No.	Subject / Course Category	Minimum Credit(s)
01	**Major**	16
02	**Minor**	07
03	**Supporting**	05
04	**Seminar**	02
05	**Research**	75
—	**Total Credits**	**105**
—	**Compulsory Non-Credit Courses**	**05**

Course No.	Course Title & Category	Credits
SEMESTER I | Major: 8 • Minor: 5 • Supporting: 0 • NCCC: 2 • Research: 10		
GPB-601*	Advances in Plant Breeding Systems (Major)	3 (3+0)
GPB-602	Advances in Biometrical Genetics (Major)	3 (2+1)
GPB-603	Molecular Cytogenetics for Crop Improvement (Major)	2 (2+0)
PP-606	Global Climate Change and Crop Response (Minor)	2 (2+0)
SST-504	Genetic Purity and DUS Testing (Minor)	3 (2+1)
PGS-501	Library and Information Services (NCCC)	1 (0+1)
PGS-504	Basic Concepts in Laboratory Techniques (NCCC)	1 (0+1)
GPB-699	Thesis Research Work	10 (0+10)
Subtotal	**Semester I Total (Major 8 + Minor 5 + Supporting 0) + Research 10 + NCCC 2**	**13 (+10 Res)**
SEMESTER II | Major: 7 • Minor: 2 • Supporting: 5 • NCCC: 2 • Research: 10		
GPB-604	Plant Genetic Resources, Conservation and Utilization (Major)	2 (2+0)
GPB-605*	Genomics in Plant Breeding (Major)	3 (3+0)
GPB-608	Breeding Designer Crops (Major)	2 (1+1)
SST-606	Advances in Seed Science (Minor)	2 (2+0)
PL.PATH-606	Plant Biosecurity and Biosafety (Supporting)	2 (2+0)
BIOCHEM-603	Biochemistry of Biotic and Abiotic Stresses (Supporting)	3 (3+0)
PGS-502	Technical Writing & Communication Skills (NCCC)	1 (0+1)
PGS-503	Intellectual Property and its Management in Agriculture (NCCC)	1 (1+0)
GPB-699	Thesis Research Work	10 (0+10)
Subtotal	**Semester II Total (Major 7 + Minor 2 + Supporting 5) + Research 10 + NCCC 2**	**14 (+10 Res)**
SEMESTER III | Major: 1 • Seminar: 1 • NCCC: 1 • Research: 10		
GPB-609*	IPR and Regulatory Mechanism (e-course) (Major)	1 (1+0)
GPB-691	Doctoral Seminar I (Seminar)	1 (0+1)
PGS-505	Agricultural Research, Research Ethics and Rural Development Programmes (NCCC)	1 (1+0)
GPB-699	Thesis Research Work	10 (0+10)
Subtotal	**Semester III Total (Major 1 + Seminar 1) + Research 10 + NCCC 1**	**2 (+10 Res)**
SEMESTER IV | Seminar: 1 • Research: 15		
GPB-692	Doctoral Seminar II (Seminar)	1 (0+1)

Course No.	Course Title & Category	Credits
GPB-699	Thesis Research Work	15 (0+15)
Subtotal	**Semester IV Total (Seminar 1 + Research 15)**	**1 (+15 Res)**
SEMESTER V | Thesis Research Work: 15		
GPB-699	Thesis Research Work	15 (0+15)
SEMESTER VI | Thesis Research Work: 15		
GPB-699	Thesis Research Work	15 (0+15)
Grand Total	**Total Coursework (16 + 07 + 05 + 02 = 30) + Research -75) (NCCC (5)**	**105 Credits**

** Compulsory Course | Note: Ph.D. students may be exempted from NCCC, if already completed during Master's degree.*

[M.Sc. (Agri.) PROGRAMME] 5.3 Plant Physiology

Sr. No.	Subject / Course Category	Minimum Credit(s)
01	**Major**	20
02	**Minor**	09
03	**Supporting**	06
04	**Seminar**	01
05	**Research**	30
—	**Total Credits**	**66**
—	**Compulsory Non-Credit Courses**	**05**

Course No.	Course Title & Category	Credits
SEMESTER I | Major: 6 • Minor: 9 • Supporting: 3 • NCCC: 2		
PP-501*	Principles of Plant Physiology - I: Plant Water Relations (Major)	2 + 1 = 3
PP-504	Physiological and Molecular Responses of Plants to Abiotic Stresses (Major)	2 + 1 = 3
BIOCHEM-501	Basic Biochemistry (Minor)	2 + 1 = 3
AGRON-501	Modern Concepts of Crop Production (Minor)	3 + 0 = 3
SST-501	Seed Developmental Biology (Minor)	2 + 1 = 3
SST-503	Seed Production Principles & Techniques in Field Crops (Supporting)	2 + 1 = 3
PGS-501	Library and Information Services (NCCC)	0 + 1 = 1
PGS-504	Basic Concepts in Laboratory Techniques (NCCC)	0 + 1 = 1

Course No.	Course Title & Category	Credits
Subtotal	**Semester I Total (Major 6 + Minor 9 + Supporting 3)**	**18 Credits**
SEMESTER II | Major: 11 • Supporting: 3 • NCCC: 2		
PP-502*	Principles of Plant Physiology – II: Metabolic Processes and Growth Regulation (Major)	2 + 1 = 3
PP-503*	Plant Developmental Biology: Physiological and Molecular Basis (Major)	2 + 1 = 3
PP-505	Physiological and Molecular Responses of Plants to Biotic Stresses (Major)	2 + 1 = 3
PP-508	Physiology of Field Crops (Major)	2 + 0 = 2
STAT-511	Experimental Design (Supporting)	2 + 1 = 3
PGS-502	Technical Writing and Communication Skills (NCCC)	0 + 1 = 1
PGS-503	Intellectual Property and its Management in Agriculture (NCCC)	0 + 1 = 1
Subtotal	**Semester II Total (Major 11 + Minor 0 + Supporting 3)**	**14 Credits**
SEMESTER III | Major: 3 • Seminar: 1 • NCCC: 1		
PP-510*	Seed Physiology (Major)	2 + 1 = 3
PP-591	Seminar	0 + 1 = 1
PGS-505	Agricultural Research, Research Ethics and Rural Development Programmes (NCCC)	0 + 1 = 1
Subtotal	**Semester III Total (Major 3 + Seminar 1)**	**4 Credits**
SEMESTER IV | Thesis / Research: 30		
PP-599	Thesis / Research	0 + 30 = 30
Grand Total	**Total Credit Load (20 + 9 + 6 + 1 + 30 + 5 NCCC)**	**71 Credits**

** Compulsory Course*

[Ph.D. PROGRAMME] 5.4 Plant Physiology

Sr. No.	Subject / Course Category	Minimum Credit(s)
01	**Major**	15
02	**Minor**	06
03	**Supporting**	05
04	**Seminar**	02
05	**Research**	75

Sr. No.	Subject / Course Category	Minimum Credit(s)
—	**Total Credits**	**103**
—	**Compulsory Non-Credit Courses**	**03**

Course No.	Course Title & Category	Credits
SEMESTER I | Major: 8 • Minor: 3 • Supporting: 2		
PP-601	Functional Genomics and Genes Associated with a Few Physiological Processes (Major)	2 + 0 = 2
PP-602*	Signal Perception and Transduction and Regulation of Physiological Processes (Major)	2 + 0 = 2
PP-604	Plant Phenomics - Next Generation Phenomics Platforms (Major)	2 + 0 = 2
PP-606	Global Climate Change and Crop Response (Major)	2 + 0 = 2
BIOCHEM-602	Advanced Molecular Biology (Minor)	3 + 0 = 3
SST-603	Physiology and Biochemistry of Seeds (Supporting)	1 + 1 = 2
Subtotal	**Semester I Total (Major 8 + Minor 3 + Supporting 2)**	**13 Credits**
SEMESTER II | Major: 5 • Minor: 3 • Supporting: 3		
PP-607*	Physiological and Molecular Aspects of Source-Sink Capacity for Enhancing Yield (Major)	3 + 0 = 3
PP-608	Seed and Fruit Growth and Their Quality Improvement (Major)	2 + 0 = 2
GPB-605*	Genomics in Plant Breeding (Minor)	3 + 0 = 3
BIOCHEM-603	Biochemistry of Biotic and Abiotic Stress (Supporting)	3 + 0 = 3
Subtotal	**Semester II Total (Major 5 + Minor 3 + Supporting 3)**	**11 Credits**
SEMESTER III | Major: 2 • Seminar: 1		
PP-610	Weed Biology and Physiology of Herbicide Action (Major)	2 + 0 = 2
PP-691	Doctoral Seminar-I (Seminar)	0 + 1 = 1
Subtotal	**Semester III Total (Major 2 + Seminar 1)**	**3 Credits**
SEMESTER IV | Seminar: 1		
PP-692	Doctoral Seminar-II (Seminar)	0 + 1 = 1
SEMESTER V &VI | Thesis / Research: 75		
PP-699	Thesis / Research	0 + 75 = 75
Grand Total	**Total Credit Load (15 Major + 6 Minor + 5 Supporting + 2 Seminar + 75 Research)**	**103 Credits**

** Compulsory Course | Note: Ph.D. students may be exempted from NCCC, if already completed during Master's degree.*

[M.Sc. (Agri.) PROGRAMME] 5.5 Seed Science and Technology

Sr. No.	Subject / Course Category	Minimum Credit(s)
01	**Major**	20
02	**Minor**	06
03	**Supporting**	04
04	**Seminar**	01
05	**Research**	30
—	**Total Credits**	**71**
—	**Compulsory Non-Credit Courses**	**05**

Course No.	Course Title & Category	Credits
SEMESTER I | Major: 10 • Minor: 3 • Supporting: 7 • NCCC: 2		
SST-501*	Seed Developmental Biology (Major)	1 + 1 = 2
SST-502	Seed Dormancy and Germination (Major)	1 + 1 = 2
SST-503*	Seed Production Principles and Techniques in Field Crops (Major)	2 + 1 = 3
SST-504*	Seed Production Principles and Techniques in Vegetable Crops (Major)	2 + 1 = 3
PP-501	Principles of Plant Physiology-I: Plant Water Relation & Mineral Nutrition (Minor)	2 + 1 = 3
BIOCHEM-501	Basic Biochemistry (Supporting)	3 + 1 = 4
ENTO-509	Pest of Field Crops (Supporting)	2 + 1 = 3
PGS-501	Library and Information Services (NCCC)	1 (0+1)
PGS-504	Basic Concepts in Laboratory Techniques (NCCC)	1 (0+1)
Subtotal	**Semester I Total Course Credit (Major 10 + Minor 3 + Supporting 7)**	**20 Credits**
SEMESTER II | Major: 10 • Minor: 3 • NCCC: 2		
SST-507*	Seed Legislation and Certification (Major)	2 + 1 = 3
SST-508*	Post Harvest Handling and Storage of Seeds (Major)	2 + 1 = 3
SST-509*	Seed Quality Testing and Enhancement (Major)	1 + 1 = 2
SST-512	Seed Health Testing and Management (Major)	1 + 1 = 2
STAT-511	Experimental Design (Minor)	2 + 1 = 3
PGS-502	Technical Writing & Communication Skills (NCCC)	0 + 1 = 1

Course No.	Course Title & Category	Credits
PGS-503	Intellectual Property and its Management in Agriculture (NCCC)	1 + 0 = 1
Subtotal	**Semester II Total Course Credit (Major 10 + Minor 3)**	**13 Credits**
SEMESTER III | Minor: 2 • Seminar: 1 • NCCC: 1		
GPB-504	Varietal Development & Maintenance Breeding (Minor)	1 + 1 = 2
SST-591	Seminar	0 + 1 = 1
PGS-505	Agricultural Research, Research Ethics and Rural Development Programmes (NCCC)	1 + 0 = 1
Subtotal	**Semester III Total (Minor 2 + Seminar 1)**	**3 Credits**
SEMESTER IV | Research / Thesis: 30		
SST-599	Research / Thesis	30
Grand Total	**Total Credit Load (Sem I–III: 36 + Thesis: 30 + NCCC: 5)**	**71 Credits**

** Compulsory Courses*

[Ph.D. PROGRAMME] 5.6 Seed Science and Technology

Sr. No.	Subject / Course Category	Minimum Credit(s)
01	**Major**	16
02	**Minor**	06
03	**Supporting**	05
04	**Seminar**	02
05	**Research**	75
—	**Total Credits**	**104**
—	**Compulsory Non-Credit Courses**	**05**

Course No.	Course Title & Category	Credits
SEMESTER I | Major: 8 • Minor: 5 • Supporting: 0 • NCCC: 2		
SST-601*	Hybrid Seed Production Technology (Major)	2 + 1 = 3
SST-603	Physiology and Biochemistry of Seeds (Major)	1 + 1 = 2
SST-604*	Genetic Purity and DUS Testing (Major)	2 + 1 = 3
PP-606	Global Climate Change and Crop Response (Minor)	2 + 0 = 2
GPB-601	Advances in Plant Breeding Systems (Minor)	3 + 0 = 3

Course No.	Course Title & Category	Credits
PGS-501	Library and Information Services (NCCC)	1 (0+1)
PGS-504	Basic Concepts in Laboratory Techniques (NCCC)	1 (0+1)
Subtotal	**Semester I Total (Major 8 + Minor 5 + Supporting 0) + NCCC 2**	**13 Credits**
SEMESTER II | Major: 6 • Minor: 0 • Supporting: 5 • NCCC: 2		
SST-605	Seed Vigour and Crop Productivity (Major)	1 + 1 = 2
SST-606	Advances in Seed Science (Major)	2 + 0 = 2
SST-608	Germplasm Conservation Techniques (Major)	1 + 1 = 2
GPB-604	Plant Genetics Resources, Conservation and Utilization (Supporting)	2 + 0 = 2
BIOCHEM-603	Biochemistry of Biotic and Abiotic Stresses (Supporting)	3 + 0 = 3
PGS-502	Technical Writing & Communication Skills (NCCC)	0 + 1 = 1
PGS-503	Intellectual Property and its Management in Agriculture (NCCC)	1 + 0 = 1
Subtotal	**Semester II Total (Major 6 + Minor 0 + Supporting 5) + NCCC 2**	**11 Credits**
SEMESTER III | Major: 2 • Minor: 1 • Seminar: 1 • NCCC: 1		
SST-607	Advances in Seed Quality Enhancement (Major)	1 + 1 = 2
GPB-609	IPR and Regulatory Mechanism (e-course) (Minor)	1 + 0 = 1
SST-691	Doctoral Seminar-I (Seminar)	0 + 1 = 1
PGS-505	Agricultural Research, Research Ethics and Rural Development Programmes (NCCC)	1 + 0 = 1
Subtotal	**Semester III Total (Major 2 + Minor 1 + Seminar 1) + NCCC 1**	**4 Credits**
SEMESTER IV | Seminar: 1		
SST-692	Doctoral Seminar-II (Seminar)	0 + 1 = 1
Subtotal	**Semester IV Total (Seminar 1)**	**1 Credit**
THESIS RESEARCH WORK | Research: 75		
SST-699	Research / Thesis	75
Subtotal	**Coursework & Seminar Subtotal (16 Major + 6 Minor + 5 Supporting + 2 Seminar)**	**29 Credits**
Grand Total	**Grand Total Credit Load (Coursework 29 + Research 75)**	**104 Credits**

** Compulsory Course | Note: Ph.D. students may be exempted from NCCC, if already completed during Master's degree.*

6. Laboratory Facilities &Equipments

Sr. No.	Equipment / Facility Name	Sr. No.	Equipment / Facility Name
01	Phytotron	**10**	Root-scanner
02	Carbonated poly houses Rainout shelter	**11**	Psychrometer
03	IRGA (Infra-Red Gas Analyzer)	**12**	NIR spectrometer
04	Binocular Microscope	**13**	Stereo zoom microscope
05	Infra-red thermometer	**14**	Porometer
06	Sap flow meter	**15**	Soil moisture meter
07	Leaf area meter	**16**	Soil water console
08	SPAD meter	**17**	Line quantum sensor
09	Gene Bank	**—**	—



Figure A: Plant Physiology Research Laboratory: Biochemical Analysis and Reagent Setup with Equipment's

7. RESEARCH INFRASTRUCTURE

7.1 Medicinal and Aromatic Plants (MAP) Project

The Medicinal and Aromatic Plants (MAP) Project focuses on the systematic collection, ex-situ field conservation, botanical characterization, and sustainable utilization of indigenous medicinal, aromatic, and spice flora. Through dedicated herbal gardens and germplasm blocks, the project safeguards rare, endangered, and commercially valuable plant genetic resources for academic research, phytochemical screening, and farmer outreach.

Sr. No.	Plant Habit / Botanical Category	Species Conserved (Till 2025)	Share of Collection (%)
01	Tree species	**120**	25.8%
02	Shrubs	**180**	38.7%
03	Climbers	**45**	9.7%
04	Annuals / Biennials	**55**	11.8%

Sr. No.	Plant Habit / Botanical Category	Species Conserved (Till 2025)	Share of Collection (%)
05	Spices & Aromatics	**65**	14.0%
—	**Total Conserved Plant Species**	**465**	**100.0%**

7.2 State Level Gene Bank (GERMPLASM CONSERVATION)

The State Level Gene Bank at Mahatma Phule Krishi Vidyapeeth, Rahuri serves as the central ex-situ seed germplasm repository for Maharashtra. It operates in close coordination with all four State Agricultural Universities (SAUs) in Maharashtra to collect, passport-document, evaluate, and preserve crop genetic diversity and traditional farmer varieties under controlled medium- and long-term cold storage modules.

6,763	**95**	**558**	**1,080**
Total Germplasm Accessions Conserved	**Diverse Agricultural & Horticultural Crops**	**Indigenous Farmer Landraces Preserved**	**Germplasm Seed Germination Tests Done**

- **Multi-University Germplasm Repository:** A total of 6,763 germplasm accessions spanning 95 crops have been systematically collected and conserved from all four Agricultural Universities of Maharashtra.
- **Conservation of Traditional Landraces:** 558 indigenous landraces possessing valuable adaptive traits for drought tolerance and pest resistance have been collected and safely stored.
- **Seed Viability & Quality Monitoring:** Routine seed germination and viability testing has been completed for 1,080 germplasm accessions across diverse crops in accordance with ISTA standards.
- **Controlled Cold-Storage Architecture:** Equipped with dedicated insulated Short-Term Storage (STS) and Long-Term Storage (LTS) walk-in cold modules with precision temperature regulation.



Figure B: Exterior front view of the State Level Gene Bank facility at MPKV, Rahuri



Figure C: Walk-in insulated cold storage modules (STS-1, STS-2 & LTS chambers) for long-term seed germplasm preservation.

7.3 Phytotron Chambers (Controlled Environment Growth Facilities)

The department is equipped with advanced, microprocessor-controlled walk-in Phytotron Chambers designed to simulate precise macro- and micro-climatic conditions independent of external seasonal fluctuations. These programmable environment chambers enable year-round, reproducible physiological, genetic, and molecular experiments under strictly regulated climatic regimes.

- **Precision Environmental Simulation:** Programmable touchscreen control systems regulate diurnal/nocturnal temperature gradients, relative humidity, photoperiod, and PAR light intensity.
- **Abiotic Stress & Climate Change Screening:** Facilitates rapid screening of crop germplasm and breeding lines against terminal heat stress, chilling injury, and drought scenarios.
- **Speed Breeding & Generation Advancement:** Enables accelerated crop growth cycles and multi-generation advancement per year in cereals, pulses, and oilseeds.
- **Postgraduate& Doctoral Research Support:** Provides essential controlled-environment infrastructure for M.Sc. (Agri.) and Ph.D. research in Plant Physiology and Plant Breeding.



Figure D: Walk-in Phytotron Growth Chambers featuring stainless-steel perforated interiors and digital programmable climate controllers.

7.4 Automated Greenhouses (Climate-Controlled Containment Facilities)

The Automated Greenhouses provide semi-controlled, sensor-driven protected cultivation spaces bridging laboratory experiments and open-field trials. Constructed with high-transmittance UV-stabilized multi-wall polycarbonate cladding and double-door airlock entry vestibules, these structures ensure bio-containment, pest exclusion, and consistent micro-climatic regulation throughout the year.

- **Automated Climate & Micro-Environment Regulation:** Integrated with automated air-conditioning/cooling units, air-circulation blowers, and sensor-based temperature controls.
- **Transgenic Containment & Hardening Facility:** Double-door entry airlocks and sealed polycarbonate enclosures provide biosafety-compliant containment for genetic lines.
- **Precision Crossing & Seed Multiplication:** Protects sensitive breeding populations, emasculated crosses, and nucleus seed material from erratic weather and insect vectors.
- **Biotic & Physiological Phenotyping:** Supports controlled pot-culture studies on nutrient-use efficiency, root-shoot partitioning, and host-pathogen interactions.



Figure D: Exterior view of the Automated Polycarbonate Greenhouses showing airlock entry vestibules and cooling units.

8. Organizational Profile & Research Stations Network

8.1 Departmental Governance, Teaching & Extension Structure

HEAD OF DEPARTMENT — DEPARTMENT OF AGRICULTURAL BOTANY

Oversees Undergraduate & Postgraduate Teaching, Statutory Academic/Research Councils, State-wide Extension Programmes, and 16 Crop & Biotechnology Research Stations across Maharashtra.

Teaching Wings	Statutory Bodies	Extension & Technology Transfer
Undergraduate Constituent Colleges (8) • Agriculture College, Pune • Agriculture College, Kolhapur • Agriculture College, Dhule • Agriculture College, Nandurbar • Agriculture College, Karad • Agriculture College, Muktainagar • Agriculture College, Halgaon • Agriculture College, Kashti **Postgraduate Centres (4)** • PGI, MPKV, Rahuri • Agriculture College, Pune • Agriculture College, Dhule • Agriculture College, Kolhapur	**Statutory Bodies (6)** • Agriculture Research Council • Council for Co-ordination & Review of Seed Production & Development Programme • Agricultural Extension Programme • Board of Studies in Agril. Botany • Faculty of Agriculture • Academic Council	**Extension & Outreach Activities** • Organization of trainings for State Departments of Agriculture, Farmers & NGOs • Publication of literature in local, National and International languages • Organization of field demonstrations, farmers' rallies, adaptive trials, and Front-line demonstrations • Transfer of Agricultural Technology through AIR and TV Programmes, and internet website • Production and supply of quality seed

8.2 Research Stations Hierarchy (Main & Sub-Research Stations)

Sr. No.	Crop / Research Area	Main Research Station	Sub-Research Station(s)
01	**Oilseed**	**Jalgaon**	Rahuri, Digraj, Karad, Kopargaon, Solapur, Igatpuri, Pandharpur
02	**Wheat**	**Niphad**	Mahabaleshwar, Kolhapur
03	**Sugarcane**	**Padegaon**	Kolhapur
04	**Sorghum**	**Rahuri**	Mohol, Karad, Gadhinglaj, Chas, Jeur, Kopargaon, Jalgaon, Dhule
05	**Bajra**	**Dhule**	Rahuri, Niphad, Chas
06	**Rice**	**Vadgaon (Maval)**	Igatpuri, Lonavala, Radhanagari, Rahuri
07	**Maize**	**Kolhapur**	—
08	**Pulses**	**Rahuri**	Jalgaon, Dhule, Padegaon, Pune
09	**Cotton**	**Rahuri**	Jalgaon, Dhule, Padegaon, Pune
10	**Jute Mesta**	**Rahuri**	—
11	**Forage and Grasses**	**Rahuri**	Dhule
12	**Minor Millets**	**Kolhapur**	Igatpuri
13	**Seed Research**	**Rahuri**	—
14	**Medicinal & Aromatic Plants**	**Rahuri**	Pune, Igatpuri, Kolhapur, Dhule
15	**Plant Tissue Culture**	**Rahuri**	Padegaon, Pune, Dhule, Kolhapur
16	**Agril. Biotechnology**	**Rahuri**	—

9. Major Academic & Research Achievements

9.1 Degrees Awarded by Discipline

Discipline	M.Sc. (Agri.)	Ph.D.	Total Degrees
Genetics & Plant Breeding	580	115	**695**
Plant Physiology	255	58	**313**
Seed Sci. & Technology	225	32	**257**
Total	1060	205	1265

9.2 Crop Improvement: Varieties & Hybrids Released

Sr.	Crop	Released	Most Popular Varieties / Hybrids (*Hybrids)
01	**Sorghum**	**25**	M 35-1, Swati, Sel. 3, Phule Yeshoda, Phule Mauli, Phule Chitra, Phule Vasudha, Phule Uttara (Hurda), CSV 22, Phule Anuradha, Phule Revati, Phule Panchami (Popping), Phule Suchitra, Phule Rohini (Papad), Phule Yeshomati, Phule Purva, Phule Madhur (Hurda), Phule Rohini, Phule Rajasvi, Phule Ojasvi, Phule Tejasvi, Phule Yashasvi; Sweet Sorghum: SSV 84, CSV 19 SS (RSSV 9), Phule Vasundhara
02	**Bajra**	**10**	Shradha*, Saburi*, Shanti*, Phule Dhanashakti*, Phule Mahashakti*, Adishakti, Phule Muktai, Phule Bahinai, MH-2114 (DHBH-1397), MH-2777 (DHBH-21002)
03	**Rice / Paddy**	**14**	Indrayani, Pavana, Kundlika, Phule Maval, Bhogawati, Phule Radha, Phule Samruddhi, Phule RDN-6, Phule Super Pawana, Phule Kolam, Phule Maval 7, Phule Maval 8, Phule Maval 9, Phule Super Radha
04	**Wheat**	**14**	NIAW 9947, Panchvati, NIAW 34, Godawari, Trimbak, Tapovan, Netravati, Phule Samadhan, Phule Satwik, NIDW 1149, Phule Anupam, Phule Anurag, Phule Shashwat, Phule Sampanna
05	**Maize**	**06**	Karveer, Rajashri, Phule Maharshri, Phule Madhu, Phule Umed, Phule Champion
06	**Chickpea**	**12**	Vijay, Vishal, PG 12, Digvijay, Rajas, Virat, Vihar, Kripa, Himali, Phule Vikram, Phule Vikrant, Phule Vishwaraj
07	**Pigeon pea**	**04**	Vipula, Phule Rajeshwari, Phule Trupti, Phule Pallavi
08	**Mungbean**	**04**	Phule M-2, Vaibhav, Phule Chetak, Phule Suvarn
09	**Urdbean**	**03**	TPU-4, Phule Vasu, Phule Rajan
10	**Horse gram**	**03**	Man, Seena, Phule Sakas
11	**Moth bean**	**02**	MBS-27, Phule Sarita
12	**Rajmabean**	**05**	Mutha, Waghya, Varun, Phule Rajma, Phule Viraj
13	**Cowpea**	**04**	Phule Pandhari, Phule Vithai, Phule Rukhmini, Phule Sonali
14	**Rajgira**	**01**	Phule Kartki
15	**Finger millet**	**02**	Phule Nachani, Phule Kasari
16	**Barnyard millet**	**01**	Phule Barti
17	**Little Millet**	**01**	Phule Ekadashi
18	**Groundnut**	**13**	Phule Pragati, Phule Vyas, TPG41, JL-501, Phule RHRG-6021, Phule Unap, Phule Varana, Phule Unnati, Phule Bharati, Phule Dhani, Phule Morna, Phule Varna, Phule Chaittanya
19	**Safflower**	**12**	Bhima, Girana, Phule Kusuma, SSF-658, SSF-708, Phule SSF-733, Phule Chandrabhaga, Phule Neera, Phule Bhivara, Phule Gold, Phule Kiran, Phule Bhoomi

Sr.	Crop	Released	Most Popular Varieties / Hybrids (*Hybrids)
20	**Sunflower**	**05**	SS 56, Bhanu, Phule Raviraj*, Phule Bhaskar, Phule Arnav
21	**Soybean**	**06**	Phule Kalyani, KS-103, Phule Agrani, Phule Sangam, Phule Durva, Phule Kimaya
22	**Mustard**	**01**	TPM-1
23	**Sesamum**	**05**	Phule Til-1, Tapi, Padma, JLT-408, Phule Purna
24	**Niger**	**04**	Sahyadri, Phule Karala, Phule Vaitarna, Phule Kalsubai
25	**Forage crops & Grasses**	**19**	African Tall, Giant Bajra, Ruchira, RL 88, Phule Harita, Phule Surabhi, Phule Amruta, SPV-2057, Stylo-Phule Kranti, Phule Jaywant, Phule Gunvant, Phule Marvel-06-40, Phule Govardhan, Phule Marvel-06-1, Phule Madras Anjan-1, Phule Godhan, RBN-17-35, RBN-16-61, Shweta
26	**Sugarcane**	**10**	Co 86032, Co 94012, Phule-265, Co92005, MS-10001, Phule-9057, Phule 11082, Phule 15012, Phule 13007, Phule 15006
27	**Cotton**	**27**	Y1, JLH 168, JLA-505, Phule Anmol, Phule Dhanwantari, Phule-688, Phule Yamuna, Phule Rukhamai, Phule 492*, Phule Tarang*, Phule Asmita*, Phule Shwetambari*, Phule Suman*, Phule 388*, Phule Dhara*, Phule Prabha*, Phule Mahi, Phule Shubhra, Phule Ekta, Phule Chetna, JLA-794, JLA-603, JLA-906, JLA-1110, JLA-1207 (Phule Satpuda), JLA-1204 (Phule Malti), JLA-1707 (Phule Narmada)
28	**Potential Crops**	**03**	Grain Amaranth: Phule Kartiki; Winged Bean: Phule Chardhari Wal, Phule Shravani

* Hybrid

10. Research Publications & Practical Manuals

10.1 Books Published

Sr.	Name of the Book	Publisher / Publication No. & Year	Author(s)
01	**Principles of Plant Breeding**	Agri. Biovet Press, New Delhi / 2013	Dr. N.S. Kute and Dr. A.R. Aher
02	**Principles of Biometrical Genetics**	Daya Publishing House, New Delhi / 2016	Dr. Nandakumar Kute and Dr. Gorakshanath Shinde
03	**Textbook of Principles of Seed Technology**	MPKV, ISBN-978-81-87552-43-7 / 2013	Dr. Sukhdev Ransing, Mr. Aniket Kalhapure
04	**Compendium of Varieties Released by Mahatma Phule Krishi Vidyapeeth**	ISBN 978-93-5126-277-0, MPKV/Res Pub/No. 67/2012	Dr. R.W. Bharud, Dr. V.R. Shelar, Dr. M.R. Manjre, Shri. A.V. Suryawanshi, Shri. P. Karjule

Sr.	Name of the Book	Publisher / Publication No. & Year	Author(s)
05	**Variety Registration & Provisions under Protection of Plant Varieties and Farmers' Rights Act, 2001**	ISBN 978-93-5126-278-7, MPKV/Res Pub/No. 56/2012	Dr. Vijay R. Shelar, Dr. Raosaheb W. Bharud, Mr. Avinash P. Karjule, Dr. Balawant S. Mundhe
06	**40 Years (1973-2013) - Pulses Research at Mahatma Phule Krishi Vidyapeeth, Rahuri**	MPKV/Res/Pub No. 121/2014	Dr. P.N. Harer, Prof. L.B. Mhase, Dr. G.P. Deshmukh, Dr. M.R. Bedis, Dr. D.D. Dudhade, Prof. S.B. Latake, Prof. A.P. Chavan, Dr. P.U. Bhosale
07	**44 Years Sorghum Research at MPKV, Rahuri**	MPKV/Extn/Pub/No. 2086/2016-17	Dr. S.R. Gadakh, Dr. M.S. Shinde, Dr. V.R. Awari, Dr. V.R. Patil, Prof. S.V. Nirmal, Dr. D.B. Pawar, Smt. R.S. Bhoge, Dr. U.S. Dalvi, Dr. U.D. Chavan

10.2 Book Chapters

Sr.	Title of Book Chapter	Book Details & Publisher	Author(s)	Year
01	**QTL Mapping: Methodology and Applications in Cereal Breeding**	In: Gupta PK and Varshney RK (eds.) Cereal Genomics II, Springer pp 275–318	Gupta P K, Kulwal PL, Mir RR	2013
02	**Association Mapping and Genomic Selection—Where Does Sorghum Stand?**	In: Rakshit, Sujay, Wang, Yi-Hong (Eds.) The Sorghum Genome, Springer pp 137–148	Dr. Kulwal PL	2016
03	**Trait Mapping Approaches Through Linkage Mapping in Plants**	In: Adv BiochemBiotechnol. 10.1007/10_2017_49 Eng DOI	Dr. Kulwal PL	2017
04	**Physiology of drought resistance in fruit crops**	Biotic and Abiotic stress Management in Fruit crops: MPKV/EDN/ Pub. No.85 Pub. Director, CAFT, MPKV, Rahuri	Dr. Wagh, R.S.	2013
05	**Leaf sap flow Chlorophyll, Water potential, transpiration and Photosynthetic rate under stresses in fruit crops**	Biotic and Abiotic stress Management in Fruit crops: MPKV/EDN/ Pub. No.85 Pub. Director, CAFT, MPKV, Rahuri	Dr. Wagh, R.S.	2012
06	**Germination**	Souvenir on Hands on training in Seed Science & Technology	Dr. S.K. Ransing	2014
07	**Dormancy**	Souvenir on Hands on training in Seed Science & Technology	Dr. S.K. Ransing	2014

Sr.	Title of Book Chapter	Book Details & Publisher	Author(s)	Year
08	**Role of plant growth regulators in fruit culture**	In: Advances in Production technology of fruit crops: Advanced Faculty Training in Horticulture (Fruits), Dept. of Horticulture, MPKV, Rahuri-413 722	Dr. Bharud, R.W., D.V. Deshmukh	2013
09	**Plant stress adaptation to water**	In: Dry land Agriculture: Kadlag, A.D., More, T.A. and Mate, S.N. Published by Agri-Biovet Press, New Delhi	Dr. Mate, S.N., Dr. Kadlag, D.V. Deshmukh, S.D. Kale	2014

10.3 Research Papers Published in International / National Journals (NAAS Rating > 6.0)

Sr.	Title of Book Chapter	Author(s)	Book Details & Publisher	NAAS
01	Association mapping for pre-harvest sprouting resistance in white winter wheat.	Kulwal P, Ishikawa G, Benscher D, Feng Z, Yu L-X, Jadhav A, Mehetre S, Sorrells ME	Theoretical and Applied Genetics 125:793–805 (2012)	**13.00**
02	Notification of crop varieties and registration of germplasm : Sorghum RSV 1006 (Phule Revati)	Shinde M.S, Gaikwad A.R and GadakhS.R	Indian J. Genet. 73(3) : 347-352 (2013)	**6.28**
03	Notification of crop varieties and registration of germplasm : Sorghum RPOSV 3 (Phule Panchami)	Shinde M.S, Gaikwad A.R and GadakhS.R	Indian J. Genet. 73(3) : 347-352 (2013)	**6.28**
04	Inheritance of blast resistance and identification of SSR marker associated with it in rice cultivar RDN 98-2.	Kumbhar SD, Kulwal PL, Patil JV, Gaikwad AP, Jadhav AS	Journal of Genetics 92:317-321 (2013)	**7.50**
05	Diversity for cell morphology, nitrogenase activity and DNA profile of Azospirillum species present in rhizosphere soils of six different physiographic regions of Maharashtra	Murumkar DR, Borkar SG & Chimote VP	Research Journal of Biotechnology 8(4): 16-25 (2013)	**6.70**
06	Interspecific hybridization in Gossypium L.: characterization of progenies with different ploidy levels confirmed multigenomic backgrounds	Newaskar GS, Chimote VP, Mehetre SS & Jadhav AS	Plant Breeding 132(3): 211-216 (2013)	**7.50**
07	In vitro plant regeneration in brinjal (Solanum melongena L.) using cotyledon, hypocotyl and root explants	B. D. Pawar, A.S. Jadhav, A. A. Kale, V.P. Chimote and S. V. Pawar	Vegetos 26(02):312-317 (2013)	**6.20**

08	Association mapping in crop plants: Opportunities and challenges.	Gupta PK, Kulwal PL, Jaiswal V	Advances in Genetics 85:109-147 (2014)	**11.43**
09	Legume genetics and genomics: recent advances (A report on VI ICLGG Conference).	Mir RR, Kulwal PL	National Academy Science Letters India 37:1-3 (2014)	**6.37**
10	Effect of heat stress on proline, chlorophyll content, heat shock proteins and antioxidant enzyme activity in sorghum (Sorghum bicolor) at seedlings stage	Gosavi GU, Jadhav AS, Pawar BD, Kale AA, Chimote VP &Gadakh SR	Indian Journal of Biotechnology 13:356-363 (2014)	**6.48**
11	Isolation, characterization, functional potential and molecular diversity of Pseudomonas fluorescens isolated from the soils of Maharashtra	Sonawane RB, Deokar CD, Chimote VP	Research Journal of Biotechnology 9(11): 93-103 (2014)	**6.29**
12	Diversity in phosphate solubilizing fungi (Aspergillus awamori and Penicillium digitatum) present in soils of Maharashtra	Murumkar DR, Borkar SG & Chimote VP	Research Journal of Biotechnology 9(8): 20-26 (2014)	**6.29**
13	Determination of morphometric, biochemical and genetic variation in Sclerotium delphinii isolates	Gawande SP, Borkar SG, Chimote VP, Nagrale DT & Sharma AK	African Journal of Microbiology Research 8(16): 1696-1703 (2014)	**—**
14	Spatial diversity of free living rhizobia present in Rhizosphere soils of six different physiographic regions of Maharashtra, India	Murumkar DR, Borkar SG & Chimote VP	Legume Research 37(2): 165-174 (2014)	**6.12**
15	Molecular analysis of cytoplasmic male sterile system of sorghum (Sorghum bicolor (L.) Moench) By RAPD and ISSR markers.	Palan, B. V., Kale, A. A., Pawar, B. D., Jadhav, A. S., Gadakh, S. R., & Chimote, V. P.	Vegetos, 27(2), 207-212 (2014)	**6.02**
16	Effect of PEG induced osmotic stress on peroxidase and superoxide dismutase isozymes in sorghum seedlings.	Damame, S. V., Lokhande, P. K., Kale, A. A., & Munjal, S. V.	Vegetos, 27(2), 272-278 (2014)	**6.02**
17	Effect of PEG induced water stress on chlorophyll content, membrane injury index, osmoprotectants and antioxidant enzymes activities in sorghum (Sorghum bicolor (L.) Moench)	Hinge P, Kale A, Pawar B, Jadhav A, Chimote V and S Gadakh	Maydica 60(1) (2015)	**6.38**
18	Molecular tagging of Asiatic soybean rust resistance in elite genotype EC 241780 reveals complementation of two genes	Bhor TJ, Chimote VP & Deshmukh MP	Plant Breeding 134(1): 1 to 8 (2015)	**7.34**

19	Notification of crop varieties and registration of germplasm : Sorghum RSV 1098 (Phule Suchitra)	Shinde M.S., Patil V.R., Awari V.R. and Gadakh S.R.	Indian J. Genet. 75(4) : 532 (2015)	**6.28**
20	Notification of crop varieties and registration of germplasm : Sorghum CSV 30 F	Shinde M.S., Patil V.R., Awari V.R. and Gadakh S.R.	Indian J. Genet. 75(4) : 532 (2015)	**6.28**
21	Marker-trait association study for protein content in chickpea (Cicer arietinum L.).	Jadhav AA, Rayate SJ, Mhase LB, Thudi M, Chitikineni A, Harer PN, Jadhav AS, Varshney RK, Kulwal PL	Journal of Genetics 94:279–286 (2015)	**7.00**
22	Antifungal, Antibacterial Activity of Camptothecin Extracted from Mappiafoetida.	Kulkarani KD, Raghuwanshi KS, RM Naik, SG Borkar, VP Chimote	Journal of Pure and Applied Microbiology 9(1): 329-334 (2015)	**6.05**
23	Activity Profile of defense related enzymes in chickpea (Cicer arietinum L.) against fusarium wilt (Fusarium oxysporum f. sp. ciceris) at different growth stages.	Dalvi US, Naik RM, Chimote VP and Harer PN	Journal of Pure and Applied Microbiology 9(spl): 463-474 (2015)	**6.05**
24	Involvement of some of defense responsive enzymes against Fusarium wilt in chickpea cultivars	Jadhav RR, Kale AA & Mhase LB	Journal of Pure and Applied Microbiology 9(spl2): 229-241	**6.05**
25	Protein content exhibits significant positive correlation with seed weight in chickpea germplasm collection.	Kulwal PL, Mhase LB	Plant Genetic Resources: Characterization and Utilization (Cambridge) 1-3 (2016)	**6.61**
26	Molecular marker based detection of leaf rust resistance gene Lr34 in Indian bread wheat (Triticum aestivum L.)	Muthe ST, Kulwal PL, Gadekar DA, Jadhav AS	Australasian Plant Pathology 45:369–376 (2016)	**7.09**
27	Characterization of Streptomyces sp. from soils of Maharashtra on the basis of their morphology, functional efficiency and molecular divergence	Sonawane RB, Deokar CD, Chimote VP	Research Journal of Biotechnology 11(1): 18-29 (2016)	**6.24**
28	Different cellulose synthase genes are prominently expressed during fiber elongation in Gossypium arboreum and G. hirsutum	Newaskar GS, Chimote VP, Jadhav AS, Pawar BD & Kale AA	Indian Journal of Biochemistry & Biophysics 54(5): 200-206 (2017)	**6.96**
29	Molecular tagging of pod shattering tolerance trait in soybean [Glycine max (L.) Merrill] genotype MACS-450	Thakre D, Chimote VP, Adsul A, Deshmukh MP &Pulate SC	Legume Research 40(2): 224-231 (2017)	**6.12**

30	Characterization of F7 introgression lines from interspecific crosses in cotton for sucking pest tolerance and improved fibre quality	Parde NS, Chimote VP & Mehetre SS	Multilogic in Science 7(23): 108-113 (2017)	**7.15**
31	Seasonal variation in sowing and its effect on ethanol and biomass yield of sweet sorghum	Gaurav S. Pagire, Sharad R. Gadakh, Manaji S. Shinde, Udaykumar S. Dalvi, Vilas R. Awari and Suraj S. Gadakh	Energy Resources: Part A, 1918290, (2021)	**7.3**
32	Sweet Sorghum: A Brief Study on a Smart Crop	Gaurav S. Pagire, Sharad R. Gadhakh, Udaykumar S. Dalvi, Mamaji S. Shinde, Vilas R. Awari, Suraj S. Gadakh	M.A.F& L.A journal: ISSN : 00845841 Volume 52, Issue 01, October, (2021)	**6.1**
33	Chickpea genotypes with ascorbic acid accumulation can mitigate the impact of high temperature stress	A.P. Solanke, S.R. Gadakh, S. Kruthika, V.R. Awari, A. Ashu, J.V. Navodhaya, C. Harimadhav, C. Laxuman and S. Gurumurthy	Functional Plant Biology, (52) FP24311, (2025)	**8.4**
34	Identifying chickpea (Cicer arietinum L.) genotypes rich in ascorbic acid as a source of drought tolerance	Dnyneshwar Raut, Gadakh S.R., Kute N.S., A. Blesseena, N.V.P.R. Gangarao, Kadam ,H.M. Siddique , Rane Jagdish	Scientific reports, (2025) 15:6019	**9.9**

10.4 Practical Manuals

Sr.	Name of Course / Manual	Publication No.	Name of Teachers
01	**Introduction to Bioinformatics (MBB 555)**	MPKV, Rahuri/ Education Pub. 17/2013	Mr. B.D. Pawar, Dr. P.L. Kulwal, Dr. A.S. Jadhav
02	**Techniques in Molecular Biology-I (MBB 505)**	MPKV, Rahuri/ Education Pub. 15/2013	Mr. B.D. Pawar, Dr. V.P. Chimote, Dr. A.S. Jadhav
03	**Principles of Biotechnology (MBB-501)**	MPKV, Rahuri/ Education Pub. 14/2013	Mr. B.D. Pawar, Dr. A.A. Kale, Dr. A.S. Jadhav
04	**Principles of Plant Breeding (GP-501)**	MPKV, Rahuri/ Education Pub. No. 13/2012	Dr. N.S. Kute, Dr. A.R. Aher
05	**Principles of Quantitative Genetics (GP-501)**	MPKV, Rahuri/ Education Pub. No. 121/2016	Dr. N.S. Kute, Dr. G.C. Shinde
06	**Principles of Plant Physiology (PP-501)**	MPKV/EDU/PUBL.No./20/2013	Dr. R.S. Wagh, Prof. S.V. Nirmal

Sr.	Name of Course / Manual	Publication No.	Name of Teachers
07	**Physiological and Molecular responses of plants to abiotic stresses (PP-503)**	MPKV/EDU/PUBL.No./23/2013	Dr. R.S. Wagh, Dr. V.R. Awari
08	**Mineral Nutrition (PP-511)**	MPKV/EDU/PUBL.No./24/2013	Dr. R.S. Wagh, Dr. S.R. More
09	**Nitrogen Metabolism (PP-610)**	MPKV/EDU/PUBL.No./21/2013	Dr. R.S. Wagh
10	**Techniques in Plant Physiology (PP-604)**	MPKV/EDU/PUBL.No./123/2016	Dr. R.S. Wagh, Dr. D.V. Deshmukh
11	**Post Harvest Physiology (PP-606)**	MPKV/EDU/PUBL.No./126/2016	Dr. R.S. Wagh, Dr. D.V. Deshmukh

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