Department of Basic Sciences
ASPEE College of Horticulture
Navsari Agricultural University,
Navsari – 396 450 (Gujarat State)

ACTIVITIES AND ACHIEVEMENTS of DEPARTMENT

ACADEMIC ACTIVITIES:

List of Courses offered by the Department for Under Graduate Programme (As per 5th Dean's Committee)

B. Sc. (Hons.) Horticulture					
S. N.	**Sem.**	**Course No.**	**Title of Course**	**Credit hrs**	**Faculty**
1	First	BSC1.1	Elementary Plant Biochemistry	2 (1+1)	Dr.Hitesh Ramani
2	First	BSC 1.2	Principles of Genetics & Cytogenetics	3(2+1)	Dr. Rehana Niyaria
3	Second	BSC 1.3	Introductory Microbiology	2 (1+1)	Dr. H.G. Suthar
4	Third	BSC 3.6	Elementary Plant Biotechnology	2 (1+1)	Dr. Kiran Suthar
5	Sixth	FLA 6.4	Breeding and seed production of flower and ornamental crops	3(2+1)	Dr. Rehana Niyaria
Total				**10 (5+5)**	

List of Courses offered Post Graduate and Doctorate Programme for Molecular Biology & Biotechnology

(As per BSMA Committee)

M. Sc. Agriculture (Molecular Biology & Biotechnology)				
S. N.	**Sem.**	**Course No.**	**Title of Course**	**Credit hrs**
1	ODD	MBB-501	Principles of Biotechnology	3+0
2	ODD	MBB-502	Fundamentals of molecular biology	3+0
3	EVEN	MBB-503	Molecular Cell Biology	3+0
4	EVEN	MBB-504	Techniques in molecular biology I	0+3
5	ODD	MBB 505	Omics and systems biology	2+1
6	EVEN	MBB-508	Introduction to Bioinformatics	2+1
7	EVEN	MBB-509	Plant Tissue culture	2+1
8	ODD	MBB-518	Gene Regulation	2+0
9	EVEN	MBB 591	Master's seminar	1+0
10	-	MBB 599	Master's Research	20 (0+20)

Ph.D. Agriculture ((Molecular Biology & Biotechnology))				
S. N.	**Sem.**	**Course No.**	**Title of Course**	**Credit hrs**
1	ODD	MBB 601	Advances in Plant Molecular Biology	3 (3+0)
2	EVEN	MBB 602	Plant Genome Engineering	3 (3+0)
3		MBB 691	Doctoral Seminar I	1 (1+0)
4		MBB 692	Doctoral Seminar II	1 (1+0)
5		MBB 699	Doctoral Research	45 (0+45)

List of Courses offered Post Graduate and Doctorate Programme for Horticulture

(As per BSMA Committee)

M. Sc. Horticulture				
S. N.	**Sem.**	**Course No.**	**Title of Course**	**Credit hrs**
1	ODD	FSC 509	Biotechnology of Fruit Crops	3 (2+1)
			Total	**3 (2+1)**

Ph.D. Horticulture				
S. N.	**Sem.**	**Course No.**	**Title of Course**	**Credit hrs**
1.	EVEN	FLS 604	Biotechnological Approaches in Floricultural Crops	3 (2+1)
2.	ODD	FSC 601	Innovative approaches in fruit breeding	3 (3+0)
			Total	**9 (6+3)**

Practical Manuals Published

Sr. No.	Course No.	Title of the Course	Academic Year
1.	BSC1.1	Elementary Plant Biochemistry	2018
2.	BSH2.6	Plant Biochemistry	2019
3.	BSC 3.6	Elementary Plant Biotechnology	2018
4.	BSC5.7	Elementary Plant Biochemistry	2018

Number of students awarded degree since commencement of PG programme in the Department

1.	**M.Sc. (PMBB)Agriculture**	**42**
2.	**Ph. D. (PMBB) Agriculture**	**22**
3.	**Dissertation**	**02**

PG students enrolled in Master Programme (2023-24) For Discipline ------Molecular Biology and Biotechnology

Sr. No.	Name & Registration no. of Student	Title of the research programme	Name of Major Guide
1.	Asondariya Krishnaben H 2010123009	Fodder quality evaluation and molecular investigation of wild rice (Oryza octata (Roxb.))from the coastal area of South Gujarat.	Dr. Vipul Patel
2.	Bangal Sharmilben D 2010123010	Biotransformation of sgriculture waste and ferulic acid to produce biovanillin.	Dr. C. V. Kapadia
3.	Dukare Nikhil Patingrao 2010123031	Phenotypic and Molecular characterization of potential multifaceted rhizobacteria of desi cotton plant and its biopriming effect on cotton seedling growth.	Dr. B.K. Rajkumar
4.	Jinjala Hardik D 2010123043	Isolation, characterization and production optimization of siderophores from microorganisms and evaluation of their potential in plant growth promotion.	Dr. C. V. Kapadia
5.	Pathak Surbhi Chetan 2010123075	Molecular characterization of spodotura litura (Fabricius) infesting cotton using CO1 gene	Dr. Rishi Kalaria

Post Graduate Students who have cleared NET in the Discipline of Plant Molecular Biology and Biotechnology

Sr. No.	Name	Year
1.	Mr. Chintan V Kapadia	2011
2.	Mr. Rishi Kalaria	2012
3.	Miss Raina Jain	2012
4.	Mr. Patil Vishal R.	2011
5.	Mr. Patel Hiren K.	2013
6.	Mr. Nand Kishore S	2013
7.	Miss Swati Patel	2014
8.	Mr. Praveen Prajapat	2014
9.	Mr. Ankit Patel	2014
10.	Mr. Haider Abbas	2014
11.	Miss. Madhuri Tandel	2013
12.	Mr. Vanrajsinh Solanki	2013
13.	Mr. Vishal Srivashtav	2012
14.	Mr. Akshay More	2020

RESEARCH ACTIVITIES.

Research Schemes in Operation

Sr. No.	Title of Research Project	Budget Head	PI	Funding Agency
1	Research in tissue culture	12014-05	HoD	GoG
2	Strengthening of Department of Biotechnology	12097	HoD	GoG

1. Strengthening of Department of Biotechnology (BH: 12097)

Objectives:

1. To conduct research related to molecular, biochemical and microbial aspects to solve agricultural problems of south Gujarat regions.
2. To impart special training to the PG students for research related to plant molecular biology to solve the agricultural problems.
3. To develop highly skilled manpower in the field of biotechnology

2. Research in tissue culture (BH: 12014-05)

Objectives:

1. Standardization of methods for establishment of tissue culture plants of horticultural crops of south Gujarat region
2. To provide training in the field of tissue culture to develop high tech human resources.

Research Recommendations:

A. Farmer recommendation

Sr. No.	Recommendations
1.	The farmers of South Gujarat growing tomato variety GT-2 are advised to spray brassinolide 10 mg per 10 liters at 25, 50 and 75 days after transplanting for enhancing lycopene, total sugar, post harvest quality up to 7 days and obtaining higher yield and net return.
2.	The farmers of South Gujarat Heavy Rainfall Agro-climatic Zone AES III growing cabbage are advised to withheld two irrigations, first at head development (35-40 DAS) and second at leaf overlapping stages (65-70 DAS) for sustaining post-harvest quality, increasing yield, saving water and to get higher net return.

B. Scientific recommendation

<table>
<tr><th>Sr. No.</th><th>Recommendation</th></tr>
<tr><td>1.</td><td>Shoot tips from 8-10 days old seedlings of cotton variety G.Cot.10 can be cultured on MS basal medium supplemented with glucose (30g/l), $MgCl_2$ (750 mg/l), clarigel (phytagel) (2.2g/l), NAA (0.05 mg/l) + BAP (0.2 mg/l). After 20 days these shoots can be rooted on ½ MS basal medium supplemented with glucose (20g/l), $MgCl_2$ (750mg/l), clarigel (phytagel) (2.2g/l) + IBA (0.1 mg/l). After hardening in the culture room for one week followed by two weeks in the green house survival percent of 81.5 % could be achieved.</td></tr>
<tr><td>2.</td><td>Best stage for maximum recovery of pectate lyase (PEL) enzyme from G-9 variety of banana pulp is 4 days after 5% etheral treatment. Optimum activity of PEL enzyme is obtained in 20mM sodium phosphate buffer at pH 8.5 and temperature 37^oC. PEL enzyme activity was increased by two thiol group chemicals (cystine and cysteine at 5.0 mM concentration) and one metal ion i.e. Mg^{2+} as $MgCl_2$ (0.6 mM concentration). Major inhibitors of PEL enzyme are phenolics (ferulic acid, caffeic acid, ρ-Coumaric acid and salicylic acid), reducing agents (ascorbic acid and sodium metabisulphite), thiol groups (β-ME and DTT) and metal ions (Ba^{2+}, Co^{2+}, Cu^{2+}, Fe^{2+} and Zn^{2+}), which may increase shelf life of banana variety G-9.</td></tr>
<tr><td>3.</td><td>In the micropropagation of stevia, nano particles(<50 nm) of ZnO (10 µM) and CuO (0.05 µM) can be incorporated in place of $ZnSO_4$& CuSO4 in the MS medium for getting more number of shoots per culture, higher fresh weight, dry weight & stevioside content (1.40% FW).</td></tr>
<tr><td>4.</td><td>It is informed to scientific community that trimming of banana sucker tip up to 3-4 leaf bases and then treating with lactic acid (0.15 %) + Tween-20 (0.1 %) + commercial bleach (0.8 %) for 30 minutes. Further, trim the sucker tip up to 1-2 leaf bases and then retreat with Sodium chlorite (0.3 %) for 30 minutes. Inoculate these explants aseptically on the culture medium to reduce bacterial and fungal contamination with culture establishment up to 66 per cent.</td></tr>
<tr><td>5.</td><td>It is informed to scientific community that replacement of laboratory grade sucrose with commercial sugar (30g/l) produced highest no. of shoots. Further, agar (4 g/l) with isabgul (10 g/l) reduces the cost of media and gives better multiplication.</td></tr>
<tr><td>6.</td><td>It is informed to scientific community to use MS medium supplemented with BAP (1.0 mg/l) + NAA (1.0 mg/l) for highest shoot multiplication and ½ MS medium supplemented with IBA (2.0 mg/l) for rooting in spine gourd (Momordica dioca Roxb.). The rooted plantlets of 6 cm shoot length be transferred from culture bottles into plastic cups containing mixture of cocopit and sand (1:1). After 21 days of hardening in the green house, these plants are ready for transfer in the soil.</td></tr>
<tr><td>7.</td><td>It is informed to scientific community that 25 out of 86 polymorphic markers are present in EST-SSR based primers (3893 EST-SSR) in chilli genotypes.</td></tr>
<tr><td>8.</td><td>It is informed to scientific community that ISSR markers are more reliable than RAPD for genetic diversity analysis. The ISSR markers UBC 841, UBC 857 and UBC 863 are most diverse for polymorphism and genetic diversity analysis in Nagli genotypes. Among 25 genotypes, GN-4 and GPU-48 & GPU-28 are genetically diverse genotypes and observed in different clusters in PCA analysis that can be used in future breeding program.</td></tr>
<tr><td>9.</td><td>It is informed to the scientific community that among 12 pigeonpea varieties analyzed, highest amount of free amino acids (1.00%) was found in GT-103, whereas highest protein content (22.21%) was present in BP-16-261. The genotypes with higher essential amino acids as mentioned below in ascending order can be considered for future pigeonpea breeding programme:
<table>
<tr><th>Sr. no.</th><th>Essential amino acid</th><th>Genotypes</th></tr>
<tr><td>1.</td><td>Arginine</td><td>Banas (19.69), GNP-2 (18.85), GT-101 (18.65)</td></tr>
<tr><td>2.</td><td>Histidine</td><td>GT-103 (9.18), GT-102 (7.65), GT-101 (6.50)</td></tr>
<tr><td>3.</td><td>Valine</td><td>GT-102 (1.36), AGT-2 (1.26), GT-1 (1.21)</td></tr>
<tr><td>4.</td><td>Methionine</td><td>GT-103 (4.10), GT-102 (3.50), GNP-3 (3.32)</td></tr>
<tr><td>5.</td><td>Phenyl alanine</td><td>AGT-2 (26.07), GJP-1 (25.11), GT-103 (24.23)</td></tr>
<tr><td>6.</td><td>Tryptophan</td><td>Banas (11.77), GJP-1 (11.14), AGT-2 (10.25)</td></tr>
<tr><td>7.</td><td>Lysine</td><td>GJP-1(6.58), GT-101 (6.23), GJP-1(6.58)</td></tr>
<tr><td>8.</td><td>Leucine</td><td>AVPP-1 (12.05), Banas (11.89), GJP-1 (11.85)</td></tr>
</table>
Value in the brackets is concentration of amino acid in mg g^{-1} unit.</td></tr>
</table>

Production of planting material

Tissue cultured Banana Plantlets (GRAND NAINE)	
Year	**Banana Plantlets**
2019-20	39028
2020-21	40345
2021-22	32816
2022-23	45888
2023-24	45543

Micropropagation of banana: [Culture Establishment]: A= Suckers of banana from elite plants, B= Trimming of suckers to isolate sucker tips, C= Isolated sucker tips ready for sterilization, D= Final trimming for inoculation, E= Sucker tips on initiation medium, F= Culture establishment.

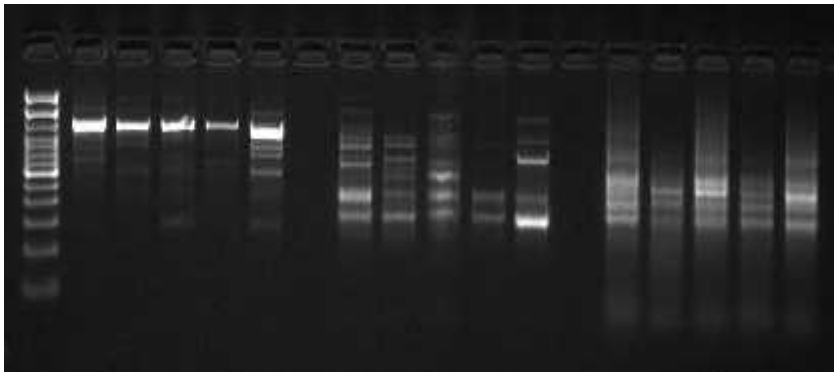
Micropropagation of banana: [Multiplication, Rooting & Hardening]: A= Multiplication of cultures, B= Subculturing on multiplication medium, C= Subculturing continued up to 8th cycle, D= Rooting of cultures, E= Primary hardening, F= Secondary hardening (Outlet of Plants).




Field performance of Banana Plantlets raised at Farmer's field-Chikhli

Pic courtesy: (Shri Ankurbhai Patel -Banana Farmer)

DNA Fingerprinting services



DNA fingerprinting done at the Department		
Samples from Industry Year 2022-24	**Paddy, Mungbean Urdbean**	**14**
Samples from NAU Year 2023-24	**Barnyard Millet, Elephant foot Yam, Tannia, Brinjal**	**04**

EXTENSION SERVICES

- Participation of faculty in *Krushi Mahotsava* Programme of GoG
- Diagnostic visits at farmers' fields.
- Dissemination of technology through publications.
- Dissemination of technical know how of the molecular and plant tissue culture techniques to the visiting students of other colleges ,schools and visiting personnel.

Infrastructure Available

1. Plant Molecular Biology Laboratory
2. Plant Tissue Culture Laboratory
3. Glass house, poly house and net house
4. Analytical instruments




PG RESEARCH LABORATORY

PLANT TISSUE CULTURE LABORATORY

SECONDARY HARDENING OF BANANA (GRAND NAINE) IN PROGRESS
(Under National Horticulture Mission funded project)
HARDENING FACILITIES

HPLC

CENTRIFUGES

FUME HOOD

ELISA READER

GEL DOC. UNIT

GCMS

HYBRIDIZATION OVEN

GEL ELECTROPHORESIS UNIT

HPTLC

INCUBATOR SHAKER

LAMINAR AIR FLOW

THERMAL CYCLERS (PCR MACHINES)

LYOPHILIZER

FLUORESCENT MICROSCOPE

PHASE CONTRAST MICROSCOPE

UV VIS SPECTROPHOTOMETER

REAL TIME PCR

TEMPERATURE CONTROLLER

ON LINE UPS