



## DEPARTMENT OF POST HARVEST TECHNOLOGY



# ACTIVITIES AND ACHIEVEMENTS

**GENESIS:** The Department of Post Harvest Technology (PHT) was established during 2004 under ASPEE College of Horticulture and Forestry, NAU, Navsari. The department teaches undergraduate courses and offers post graduate programs supported by well-trained faculty. At present two years M.Sc. and three years Ph.D. Degree Programmes are running in the Department of Post Harvest Technology. These degree programmes are formulated for developing competent Human Resource Power for which significant job opportunities exist in this country. With advancement in production technology, the high yield / area of crops lead to large amount of marketable surplus of food grains and crop residues, demanding appropriate handling, processing, preservation, storage, marketing and utilization. The development of processing industries to preserve the perishable agricultural produce will not only improve economic and nutritional status of our population but it may help in employment generation in rural as well as urban areas of the country. This can be achieved by linking production, and post harvest technology in synergistic way. For this purpose, the department is equipped with excellent Fruit and Vegetable Processing Units for pilot scale testing of technologies, providing in-plant training and imparting community canning service to the students, farmers and entrepreneurs.

## ACADEMIC ACTIVITIES

### LIST OF COURSES OFFERED BY THE DEPARTMENT (AS PER 5<sup>TH</sup> DEANS' COMMITTEE)

<b><u>B. Sc. (Hons.) Horticulture</u></b>					
<b>Sr. No.</b>	<b>Sem.</b>	<b>Course No.</b>	<b>Title of Course</b>	<b>Credit hrs</b>	<b>Faculty</b>
<b>1.</b>	1 <sup>st</sup>	PHT 1.1	Fundamentals of Food & Nutrition	2(1+1)	Mr. J. M. Mayani
<b>2.</b>	5 <sup>th</sup>	PHT 5.2	Postharvest Management	3(2+1)	Mr. J. M. Mayani/

			of Horticultural Crops		Dr.N.V. Patel
3.	6 <sup>th</sup>	PHT 6.3	Processing of Horticultural Crops	3(1+2)	Dr. Dev Raj/Mr. J. M. Mayani
<b>Sub-Total</b>				<b>08 (4+4)</b>	
<b>STUDENT READY-I: Experiential Learning Programme</b>					
<b>Model No. 1</b>		<b>HWE 7.3</b>	<b>Post Harvest Handling and Value addition in Horticultural crops</b>	<b>10 (0+10)</b>	<b>Name of Teacher</b>
	VII	HWE 7.3.1	Preparation and evaluation of processed products	6(0+6)	Dr. Dev Raj / Mr. J.M. Mayani
		HWE 7.3.2	Packing and Marketing of processed products	4(0+4)	Dr.N.V. Patel
<b>STUDENT READY-II: Rural Horticultural Work Experience</b>					
1.	VIII	RHWE 8.6	University farms (NAU) and Visit to horticulture based industries of South Gujarat region	4(0+4)	Er.A.K. Senapati/ Dr.N.V. Patel
<b>Sub-Total Student Ready</b>				<b>14 (0+14)</b>	
<b>Total</b>				<b>22(4+18)</b>	

**LIST OF COURSES OFFERED BY THE DEPARTMENT  
(AS PER 4<sup>th</sup> DEANS' COMMITTEE)**

<b>B. Sc. (Hons.) Horticulture</b>					
Sr.No.	Semester	Course No.	Title of Course	Credit hours	Faculty
1.	2 <sup>nd</sup>	PHT 2.1	Food Science and Technology	2(1+1)	Mr. J. M. Mayani
2.	5 <sup>th</sup>	PHT 5.2	Processing of Horticultural Crops	3(1+2)	Dr. Dev Raj / Mr. J. M. Mayani
3.	6 <sup>th</sup>	PHT 6.3	Post Harvest Management of Horticultural Crops	3(2+1)	Mr. J. M. Mayani/Dr. Dev Raj
	7 <sup>th</sup>	HWE-7.5.1	Orientation, project formulation and planning for processing of fruits	2(0+2)	Er. P.S. Pandit
		HWE-7.5.2	Preparation and evaluation of processed products of fruits	6(0+6)	Mr. J. M. Mayani
		HWE-7.5.3	Economics and marketing of processed products of fruits	2(0+2)	Mr. J. M. Mayani
		HWE-7.6.1	Orientation, project formulation and planning for processing of	2(0+2)	Er. F.M. Sahu/Er.

			vegetables		A.K. Senapati
4.		HWE-7.6.2	Preparation and evaluation of processed products of vegetables	6(0+6)	Dr.Devraj
		HWE-7.6.3	Economics and marketing of processed products of vegetables	2(0+2)	Dr. H.G .Suthar
5.	8 <sup>th</sup>	HWE-8.5 (RAWE)	University farm (NAU) and private horticultural field visit of south Gujarat region	5(0+5)	Er. A.K. Senapati/ Dr. N.V. Patel
<b>Total</b>				<b>33(4+29)</b>	

### LIST OF COURSES: AS PER 4<sup>TH</sup> DEANS' COMMITTEE

#### M. Sc. (Horticulture)-POST HARVEST TECHNOLOGY

Sr.No.	Semester	Course No.	Title of Course	Credit hrs	Faculty
1.	Odd	PHT:501*	Principles of Post Harvest Management for Perishable Horticultural Produce	2(1+1)	Er. A. K. Senapati
2.	Even	PHT:502*	Fundamentals of Processing of Fruits and Vegetables	2(1+1)	Dr. Dev Raj
3.	Odd	PHT:503*	Laboratory Analysis and Quality Assurance Techniques of Fresh and Processed Horticultural Produce	2(1+1)	Dr. H.G. Suthar
4.	Even	PHT:504*	Techniques for Sensory Analysis For Processed Produce	2(1+1)	Er. P.S. Pandit
5.	Odd	PHT:505*	Pre-Harvest Practices Affecting Post Harvest Life of Perishable Horticultural Produce	2(2+0)	Dr. N. V. Patel
6.	Even	PHT:506	Principles of Post Harvest Management of Spices and Plantation Crops	2(1+1)	Er. F. M. Sahu
7.	Odd	PHT:507	Principles of Post Harvest Management of Ornamental, Medicinal and Aromatic Plants	2(1+1)	Er. F. M. Sahu
8.	Even	PHT:508	Processing of Plantation Crops, Spices, Medicinal and Aromatic Plants	2(1+1)	Dr. N. V.Patel
9.	Odd	PHT:509	Packaging of Perishable Horticultural Produce	2(1+1)	Dr.Dev Raj and AK Senapati

<b>10.</b>	Even	PHT:510	Packaging Technology of Processed Horticultural Produce	3(2+1)	Er. A. K. Senapati
<b>11.</b>	Odd	PHT:511	Process Engineering of Horticultural Crops	3(2+1)	Er. P.S. Pandit
<b>12.</b>	Even	PHT:512*	In-Plant Training (Compulsory course)	NC	Er. P.S. Pandit
<b>13.</b>	Even/Odd	PHT:591	Master's Seminar	1(1+0)	PG Guide
<b>14.</b>	Even/Odd	PHT:599	Master's Research(Major Subject)	20(0+20)	PG Guide
<b>*Compulsory</b>				<b>Sub-Total</b>	<b>55(15+30)</b>
<b>COMPULSORY NON-CREDIT COURSES</b>					
<b>1.</b>	Odd	PGS 501	Library and information services	1(0+1)	
<b>2.</b>	Even	PGS 502	Technical writing and communications skills	1(0+1)	
<b>3.</b>	Odd	PGS 503	Intellectual property and its management in agriculture (e-course)	1(1+0)	
<b>4.</b>	Even	PGS 504	Basic concepts in laboratory techniques	1(0+1)	
<b>5.</b>	Odd	PGS 505	Agricultural research, research ethics and rural development programmes (e-course)	1(1+0)	
<b>6.</b>	Even	PGS 506	Disaster management (e-course)	1(1+0)	
				<b>Sub-Total</b>	<b>6 (3+3)</b>
				<b>Total</b>	<b>61 (18+33)</b>

## LIST OF COURSES: AS PER 4<sup>TH</sup> DEANS' COMMITTEE

<b>Ph. D. (Horticulture) - POST HARVEST TECHNOLOGY</b>					
<b>Sr.No.</b>	<b>Semester</b>	<b>Course No.</b>	<b>Title of Course</b>	<b>Credit hrs</b>	<b>Faculty</b>
<b>1.</b>	Odd	PHT:601**	Advances in Post Harvest Management of Fresh Horticultural Produce	2(2+0)	Dr. NV Patel
<b>2.</b>	Even	PHT:602**	Advances in Laboratory Techniques and Research Methodology in Post Harvest Technology	3(1+2)	Dr. H.G. Suthar
<b>3.</b>	Odd	PHT:603**	Advances in Processing Technology of Horticultural	3(3+0)	Dr. Dev Raj

Crops					
4.	Even	PHT:604	Packaging House Operations And Transportation Of Fresh Horticultural Produce	2(2+0)	Dr. N. V.Patel /Dr. C. S. Desai
5.	Odd	PHT:605	Commercial Aspects of Post Harvest Technology of Horticultural Produce	2(2+0)	Dr. C. S. Desai
6.	Even	PHT:606	Dehydration Technology of Horticultural Produce	3(2+1)	Dr. Dev Raj
7.	Odd	PHT:607	Freezing Technology of Horticultural Produce	3(2+1)	Dr. Dev Raj
8.	Even	PHT:608	Fruit and Vegetable Fermentation Technology	3(2+1)	Dr. H.G. Suthar
9.	Odd	PHT:609	Waste Management from Horticulture Processing Industries	3(2+1)	Dr. H.G. Suthar
10.	Even/Odd	PHT:691	Doctoral Seminar- I	1(1+0)	PG Guide
11.	Even/Odd	PHT:692	Doctoral Seminar- II	1(1+0)	
12.	Even/Odd	PHT:699	Doctor's Research (Major Subject)	45(0+45)	PG Guide
<b>**Compulsory</b>				<b>Total</b>	<b>64(13+51)</b>

### Practical Manuals Published

Sr. No.	Course No.	Title of the Course	Academic Year
1.	PHT 2.1	Fundamentals Food Science and Technology	2012-13 & 2014-15
2.	PHT 1.1	Fundamentals Food and Nutrition	2017-18
3.	PHT 5.2	Post Harvest Management of Horticultural Crops	2010-11, 2013-14 & 2015-16
4.	PHT 6.3	Processing of Horticultural Crops	2017-18

### Activities under ELP

Post Harvest Handling and Value addition in Horticultural crops	
Year	Students Enrolled
2011-12	10
2012-13	10
2013-14	11
2014-15	18
2015-16	22
2016-17	16

## Objectives

1. To impart orientation for project formulation to establish processing plant.
2. To impart training on processing and value addition for development of entrepreneurship skills in students for self employment.
3. To train the students for quality evaluation of the processed products.
4. To work out economics and breakeven point of processed products.

## Revenue earned Year wise

Year	Product being developed under EL	Revenue Generated (₹)
2012-13	➤ Onion flakes and other value added fruits and vegetable products	89225
2013-14	➤ Onion flakes and other value added fruits and vegetable products	297255
2014-15	➤ Onion flakes and other value added fruits and vegetable products	412355
2015-16	➤ Onion flakes and other value added fruits and vegetable products	448930
2016-17	➤ Onion flakes and other value added fruits and vegetable products	458879



Products prepared under ELP



Students trained under ELP during 2012-13





**Sale of the Products by Students under ELP during 2014-15**



**Students trained under ELP during 2015-16**

**PG students presently enrolled in Master Programme**

Sr. No.	Name of Student	Registration No.	Title of the research programme	Major Guide	Year of enrollment
1.	ASHUQULLAH	2020215004	Evaluation of sweet potato { <i>Ipomoea batatas</i> (L) Lam} varieties and pre-treatments for dehydration into flour	Dr. Dev Raj	2015

2.	BHARAI RAMBHAI BOGHABHAI	2020215007	Standardization of process for juice clarification from banana ( <i>Musa paradisiaca</i> L.)'	Dr. S. Arbat	2015
3.	DHOLIYA DHAVALKUMAR RAMESHBHAI	2020215018	Reduction of Postharvest Loss and Prolong the Shelf-Life of Banana Through Hot Water Treatment Cv. Grand Naine	Dr CS Desai	2015
4.	KOTHARIYA BHAVESH HARJEEBHAI	2020215027	Standardization of process for juice clarification from aonla ( <i>Emblica officinalis</i> G.) fruits	Dr. S. Arbat	2015
5.	MADHUSUDAN R	2020216014	Effect of pre-cooling on quality and shelf-life of banana cv. Grand naine	Dr. C. S. Desai	2016
6.	NAIK POOJABEN RAJESHBHAI	2020216020	Standardization of technology for preparation of carrot candy ( <i>Daucus carota</i> L.)	Dr. N. V. Patel	2016

### PG students presently enrolled in Doctoral Programme

Sr. No.	Name of Student	Registration No.	Title of the research programme	Major Guide	Year of enrollment
1.	Mayani Jilen M	04-1360-2012	Study the effect of hot water dip treatment on eradication of fruit fly, ripening, quality and shelf life of mango ( <i>Mangifera indica</i> L. cvs. Kesar and Alphonso) for export purpose	Dr NL Patel	2012-13
2.	TANVEER AHMAD	1020214015	Utilization of mango ( <i>Mangifera indica</i> L.)	Dr. Dev Raj	2014-15



			processing industry waste for value addition		
3.	SANDEEPKUMAR L. SANGANI	1020214014	Studies on preparation of protein enriched Pre-biotic carambola-guava blended beverage	Dr. Dev Raj	2014-15
4.	VAGHASHIYA JAYSUKHBHAI MANJIBHAI	1020215013	Studies on processing and value addition of Aloe vera ( <i>Aloe barbadensis</i> Miller.)	Dr. Dev Raj	2015-16
5.	PARESH ZINZALA	1020216010	Processing and value addition of bael ( <i>Aegle marmelos</i> L.	Dr. Dev Raj	2016-17

**Post Graduate Students Awarded Masters Degrees  
in the discipline of Post Harvest Technology**

Sr. No	Name of PG Student	Registration No.	Title of the Thesis	Name of Major Guide	Year of Passing
1.	Chirag S. Desai	04- -2004	Evaluation of some mango ( <i>Mangifera indica</i> L) Varieties for pulp processing	Dr. A. G. Naik	<b>2006</b>
2.	Mulla Atik Mohiuddin	04-0018-2004	Standardization of mixed fruit jams technology based on sapota ( <i>Manilkara achras</i> (Mill.) Fosberg) fruits	Dr.S.N. Vaghani	<b>2007</b>
3.	Desai Pritibahen Ratilal	04-012-2004	Standardization of mixed fruit jelly technology based on sapota ( <i>Manilkara achras</i> (Mill.) Fosberg) fruits	Dr.S.N. Vaghani	<b>2007</b>
4.	S. K. Meena		Standardization of chutney based on sapota ( <i>Manilkara achras</i> (Mill.) Fosberg) fruits	Dr.S.N. Vaghani	<b>2007</b>
5.	Mandalik	04-0258-2006	Evaluation of banana	Dr. A.G.	<b>2008</b>

	Ganesh BheemRao		varieties ( <i>Musa paradisiaca</i> L.) for dehydrated powder	Naik	
<b>6.</b>	Patel KetanKiranbhai	04-0266-2006	Standardization of medicinal jam based on sapota ( <i>Manilkara achras</i> (Mill.) Fosberg) fruits	Dr.S.N. Vaghani	<b>2008</b>
<b>7.</b>	Chaudhary Sachin Devram	04-0255-2006	Standardization of mixed fruit beverage based on sapota ( <i>Manilkara achras</i> (Mill.) Fosberg) fruits	Dr.S.N. Vaghani	<b>2008</b>
<b>8.</b>	Patel Niketa kumari Bhikhubhai	04-0376-2007	Standardization of blended gulkand based on sapota ( <i>Manilkara achras</i> (Mill.) Fosberg) fruits	Dr.S.N. Vaghani	<b>2009</b>
<b>9.</b>	Patel Jilen Mansukhbhai	04-0265-2006	Standardization of low calories based on sapota ( <i>Manilkara achras</i> (Mill.) Fosberg) fruits	Dr.S.N. Vaghani	<b>2009</b>
<b>10.</b>	Patel Ketan Ramniklal		Standardization of <i>chyanprash</i> based on sapota ( <i>Manilkara achras</i> (Mill.) Fosberg) fruits	Dr.S.N. Vaghani	<b>2009</b>
<b>11.</b>	Sangani Sandeepkumar Labhubhai	04-0383-2007	Standardization of herbal instant beverages based on sapota ( <i>Manilkara achras</i> (Mill.) Fosberg) fruits	Dr.S.N. Vaghani	<b>2009</b>
<b>12.</b>	Mirza Asef Alibaig	04-0371-2007	Evaluation of garlic ( <i>Allium sativum</i> L.) varieties for powder processing	Dr. A.G. Naik	<b>2009</b>
<b>13.</b>	Wankhede Ganesh Parameswar	04-0385-2007	Evaluation of Potato ( <i>Solanum tuberosum</i> L.) varieties for dehydrated chips processing	Dr. A.G. Naik	<b>2009</b>
<b>14.</b>	Dhawlekapil Namdeorao	04-0364-2007	Evaluation of tomato varies( <i>Lycopersicon esculentum</i> L.) for dehydrated powder	Dr. A.G. Naik	<b>2009</b>
<b>15.</b>	Arbat Shakti Sahebrao	04-0361-2007	Evaluation of different sapota ( <i>Manilkara achras</i> (Mill.) Fosberg) varieties for dehydrated sapota slices	Dr. A.G. Naik	<b>2009</b>
<b>16.</b>	Mingere Sainath Subhash		Evaluation of mango ( <i>Mangifera indica</i> L.)	Dr. A.G. Naik	<b>2010</b>

			varieties for nectar product processing		
<b>17.</b>	Parekh Jenish Harhadrai		Standardization of fortified mango ( <i>Mangifera indica</i> L.) bar with desiccated coconut powder	Er. A.K. Senapati	<b>2011</b>
<b>18.</b>	Naik Ronakkumar Ajaybhai		Standardization of guava and papaya based fruit bar	Er. A.K. Senapati	<b>2011</b>
<b>19.</b>	Tanveer Ahmad Qadeer Ahmad	04-0882-2010	Standardization of nectar respective pulp percentage and TSS from guava ( <i>Psidium guajava</i> L.) cv. lalit	Er. A.K. Senapati	<b>2012</b>
<b>20.</b>	Bhani Ram	04-1062-2011	Extraction of fragrant from spider lilly ( <i>Hymenocallis literollis</i> )	Er. P.S. pandit	<b>2013</b>
<b>21.</b>	Vagadia Piyush Shambhubhai	04-1113-2011	Standardization of papaya ( <i>Carica papaya</i> L.) cv. Taiwan and banana ( <i>Musa paradisiaca</i> ) cv. Grand naine based fruit bar	Er. A.K. Senapati	<b>2013</b>
<b>22.</b>	NaikKaushal Bhaveshbhai	04-1089-2011	Evaluation of different varieties of aonla ( <i>Emblica officinalis</i> Gaertn) for intermediated moisture aonla shreds	Er. A.K. Senapati	<b>2013</b>
<b>23.</b>	Nazaneen Nazeerahammad Shaikh	04-1343-2012	Studies on osmo-dehydration of pine apple ( <i>Anannas comosus</i> L.(Merr.)) cubes	Er. A.K. Senapati	<b>2014</b>
<b>24.</b>	Patel Keyurkumar Amratbhai	04-1309-2011	Design and development of Boondi making machine	Er. A.K. Senapati	<b>2014</b>
<b>25.</b>	Gamiti Urvashikumari Rohitbhai	2020213011	Studies on dehydration of pomegranate ( <i>Punica granatum</i> L.) Arils	Er. A.K. Senapati	<b>2015</b>
<b>26.</b>	Vaghashiya Jaysukhbhai Manjibhai	2020213045	Study on preparation of health drink by blending <i>Aloe vera</i> , Bitter gourd, Aonla and Guava	Dr. Dev Raj	<b>2015</b>
<b>27.</b>	Bhatt Ashish kumar Harehbhai	2020213004	Standardization of process for preparation of nectar from pomegranate ( <i>Punica</i>	Shakti S Arbat	<b>2015</b>

			<i>granatum</i> L.) Bhagwa		
<b>28.</b>	Mistry Riddhi Atulbhai	2020213018	Studies on feasibility of blending custard apple with banana for preparation of nectar	Dr. Dev Raj	<b>2015</b>
<b>29.</b>	Patel Jigarbhai Gamanbhai	2020213029	Standardization of process for preparation of ready to use flavoured sapota powder	Dr. C.S. Desai	<b>2015</b>
<b>30.</b>	Chethan Prasad HP	2020213007	Development of technology for processing and value addition of watermelon( <i>Citrullus lanatus</i> )	Dr. Dev Raj	<b>2015</b>
<b>31.</b>	Pandit Parth Dharmendrabhai	2090213002	Microwave assisted convective drying characteristics of elephant foot yam( <i>Amorphaophallus paeoniifolious</i> (Densst) Nicolson)	Er. F.M. Sahu	<b>2015</b>
<b>32.</b>	Godhani Prafulkumar Govindbhai	2090213001	Design and development of banana bunch harvesting tool	Er. P.S. pandit	<b>2015</b>
<b>33.</b>	Pandya Priyanka Chetan	2090213003	Design and development of banana slicing tool	Er. P.S. pandit	<b>2015</b>
<b>34.</b>	Zinzala Paresh Bhikhabhai	2090214042	Evaluation of UV light effect for preparation of <i>aloe vera</i> , bitter gourd, aonla and guava blended nectar	Dr. Dev Raj	<b>2016</b>
<b>35.</b>	Lavanya Tehsildar	2090214019	Optimization of blend for the preparation of nectar using aloe vera ( <i>Aloe barbandensis</i> Miller.), guava ( <i>Psidium guajava</i> L.) and jamun ( <i>Syzigium cumini</i> L.)	Dr. Dev Raj	<b>2016</b>
<b>36.</b>	Riddhi Desai Prakashkumar	2090214011	Standardization of ginger flavoured aonla-carrot blended beverage.	Dr. Arbat Shakti Sahebrao	<b>2016</b>
<b>37.</b>	Patel Santosh V.	2090214036	Standardization of blended nectar using banana pseudostem sap and mango pulp	Dr. C. S. Desai	<b>2016</b>

**Post Graduate Students Awarded Doctoral Degrees  
in the discipline of Post Harvest Technology**

Sr. No	Name of PG Student	Registration No.	Title of the Thesis	Name of Major Guide	Year of Passing
1.	Desai Shaunakkumar Kishorchandra	04-0256-2006	Evaluation of some tomato varieties ( <i>Lycopersicon esculentum</i> L.) for Ketchup processing	Dr. A.G. Naik	2009
2.	Desai Chirag S		Effect of post harvest treatment and packaging on mango cv Kesar	Dr. A.G. Naik	2009
3.	P. P. Relakar		Value added products of sapota	Dr. AG Naik	2010
4.	Patel Nilambahen Vinubhai	04-0577-2009	Value added Products of banana ( <i>Musa paradisiaca</i> ) cv. Grand naine blended with pine apple ( <i>Anannas comosus</i> L.(Merr.) cv. Queen	Dr. A.G. Naik	2013
5.	Arbat Shakti Sahebrao	04-0577-2009	Value added Products of aonla ( <i>Embllica officinalis</i> Gaertn) cv. NA-7 blended with pine apple ( <i>Anannas comosus</i> L.(Merr.) cv. Queen	Dr. A.G. Naik	2013
6.	Patel Niketa Bhikhubhai	04-1117-2011	Effect of post harvest treatments, packaging and storage conditions on shelf life and quality of okra and pointed gourd	Dr. N. L. Patel	2016
7.	Vaghadiya S Piyush	1020213012	Standardization of packaging and storage technology for tender fruit endosperm and sap of Palmyra Palm	Dr. N. L. Patel	2016

## Post Graduate Students who have cleared NET in the Discipline of Post Harvest Technology

Sr. No.	Name	Year
1.	Jilen M. Mayani (Horticulture)	2010
2.	Chirag S. Desai (Horticulture)	2010
3.	Patel Niketakumari Bhikhubhai (Horticulture)	2010
4.	Arbat Shakti Sahebrao (Horticulture)	2011
5.	Sangani Sandeepkumar Labhubhai (Horticulture)	2011
6.	Nazaneen Nazeerahammad Shaikh (Fruit Science)	2015
7.	Vaghashiya Jaysukhbhai Manjibhai (Vegetable Science)	2016
8.	Tanveer Ahmad Qadeer Ahmad (Fruit Science)	2016

## Medalist Students of the Department

Sr. No.	Name of student	Year
<b>M. Sc. (Horticulture) Post Harvest Technology and Ph.D</b>		
1.	Patel Niketakumari Bhikhubhai (M.Sc)	2011
2.	Arbat Shakti Sahebrao (Ph.D.)	2014
3.	Nazaneen Nazeerahammad Shaikh (M. Sc)	2015



**Nazaneen Nazeerahammad Shaikh (2015)**



## Coaching Classes

Year	Examination	Period	Faculty Members
2012	NET and JRF	10 hours	Er AK Senapati
2013	NET and JRF	10 hours	Er AK Senapati
2014	NET and JRF	10 hours	Er AK Senapati
2015	NET and JRF	10 hours	Er AK Senapati
2016	NET and JRF	10 hours	Dr Dev Raj, Dr Nilam V Patel and Er AK Senapati

## Exposure Visit of Students



## RESEARCH ACTIVITIES

### Focus Areas of Research:

- ✓ Development of cool chain, low cost storage, handling and packaging techniques.
- ✓ Exploration of plant extracts in extension of storage life of fruits and vegetables.
- ✓ Development of processes for the preparation of instant and extruded food products.
- ✓ Development of technology for processing and value addition of wild fruits.
- ✓ Preparation of natural flavonoids, antioxidants, bio-colours and health foods.
- ✓ Research on fungal toxins' occurrence and remedies in cereals, fruits, nuts and their products (e.g. patulin, aflatoxin, rubratoxin, fumonisin, ochratoxinetc).
- ✓ Development of convenient and functional processed products by incorporation of milk, milk products, oat, linseed, soybean, sunflower seed into fruit and vegetable products.
- ✓ Development and evaluation of natural colours from fruit and vegetable.
- ✓ New convenience value added food products from wastes of fruit and vegetable industry.
- ✓ Establishment of HACCP protocols for different food commodities for TQM.
- ✓ Technology for the preparation of health oriented appetizer, nectar, jam, squash, chutney, leather, toffee, instant powder etc.
- ✓ Screening of tomato varieties & hybrids for the preparation of juice, puree, paste, ketchup & canning.
- ✓ Technology for preparation of low calorie health drinks from fruits & vegetables.
- ✓ Technology for the preparation of dehydration of fruits and vegetables.
- ✓ Osmo-canning technology for suitable fruits and vegetables.
- ✓ Development of fruit juice based carbonated beverages.
- ✓ Development of technology for extraction of pectin & essence from mango waste.
- ✓ Utilization of mango peel for conversion of edible products.
- ✓ Development of protocol for extension of storage life of cut flower crops.
- ✓ To provide community canning services to the university employees and nearby farmers.

## Research Schemes in Operation

Sr. No.	Name of Research Project	Budget Head No.	Year of Commencement	Type of Scheme/ ICAR/Other agency	PI & Co-PI
1.	Center of Excellence on Post Harvest Technology	12935	2004-05	Govt. of Gujarat (Plan)	Dr. Dev Raj
2.	Strengthening of P.G. Programme of Post Harvest Technology & Process Engineering (Phase-II)	12244	2010-11	Govt. of Gujarat (Plan)	Dr. Dev Raj
3.	Establishment of Fruits and Vegetable Packaging Research Station Including Seeds	12940	2009-10	Govt. of Gujarat (Plan)	Dr. Dev Raj

### 1. Center of Excellence on Post Harvest Technology (BH: 12935)- Plan

#### Objectives:

- a) To conduct basic and applied research in the area of handling, preservation, storage and processing of major horticultural crops.
- b) To impart education on post harvest technology.
- c) Testing of the developed technologies on commercial scale.
- d) Training of the entrepreneurs.
- e) Technology transfer to farmers and industries.
- f) To provide advisory and consultancy services to agro processing industries.

**Number of experiments under operation: 11**

### 2. Strengthening of P.G. Programme of Post Harvest Technology & Process Engineering (Phase-II) (BH: 12244)- Plan

#### Objectives:

- a) To establish PG faculty of Post Harvest Technology & Process Engineering
- b) Diversification and upgradation to Post Harvest Technology & Process Engineering education research and extension

**Number of experiments under operation: 6**

### 3. Establishment of Fruits and Vegetable Packaging Research Station Including Seeds (BH: 12940)- Plan

#### Objectives:

- a) To conduct applied research work on the subject of post harvest packaging, storage and transportation of fruits and vegetables as well as seed.
- b) To popularize the methods and techniques of post harvest handling of fruits and vegetables as well as seed to avoid post harvest losses as per client specific requirement,
- c) To provide all the basic facilities of Pack House on rental basis to the farmers, merchants, processors and Exporters.
- d) To provide advisory and consultancy services to fresh supply chain and processing to industries for the export.

**Number of experiments under operation: 5**

#### Overview of Research Trials

	
<b>Technology for preparation of freeze dried Sapota Chips</b>	<b>Technology for extraction of Noni Juice</b>
	
<b>Technology for preparation of Banana Pseudostem RTS</b>	<b>Technology for preparation of Noni Mango nectar</b>



	
<b>Technology for utilization of banana peel for preparation of Sev</b>	<b>Technology for dehydration of Onion flakes</b>
	
<b>Technology for dehydration of Okra</b>	<b>Technology for dehydration of Cauliflower</b>

## Research Achievements

### (A) RECOMMENDATIONS

#### **1. Effect of pre-cooling treatments and packaging materials for extending the initiation of ripening and shelf-life of sapota.**

Farmers and merchants are advised to pre-cool the Sapota fruit at 10°C in pre-cooling chamber with air movement of 263- 340-350 m<sup>3</sup>/min for 5h can extends the shelf life of sapota fruits by 2 additional days

#### **2. Standardization of process for freeze drying of Sapota chips**

High quality dehydrated sapota chips can be prepared by pre-freezing 5 mm thick Sapota slices in freezers for 10 hours followed by freeze drying under vacuum of 760mm Hg at a temperature of 70°C for 12 hours.

#### **3. Effect of pre-cooling treatments and packaging materials for extending the initiation of ripening and shelf-life of mango cv. Kesar.**

The house approved the recommendation. The recommendation is Farmers and merchants are advised to pre-cool the Kesar mango fruit at 10°C in pre-cooling chamber with air movement of 300-350 m<sup>3</sup>/min for 8h and pack them in 75micron polypropylene bag and store at 11±1°C with 90-95% RH. This would delay the initiation of ripening process up to 25days of storage and extend the shelf life up to 35 days.

#### **4. Standardization of ready-to-eat pickle (*Moriya*) from immature dropped mango (*Marva*).**

Farmers are recommended to prepare ready-to-eat pickle (*Moriya*) from the immature dropped mango (*Marva*) through the process of washing, cutting and subsequently dipping in hot water (50 °C) for 5 min, 2% brine solution for 5 min and 5% acetic acid (vinegar) for 5 min, and finally mixing with the groundnut oil (2.5%)-spices mix and packing of in 75 micron HDPE bag to achieve shelf life of 6 days and 15 days at ambient and refrigerated storage condition, respectively.

#### **5. Standardization of colour extraction technique from *Butea monosperma* flowers for preparing herbal *gulal***

It is recommended that, the *Butea monosperma* flower could be used for colour dye extract using 50% methanol water based v/v solution at 60°C temperature and 4 hr. process time. The extracted colour matter dye could be use for production of herbal '*gulal*'.

#### **6. Preparation of Ready to Serve (RTS) beverage from banana pseudostem sap.**

It is recommended to farmers, processors and home-maker that, the RTS beverage prepared from blend of banana pseudostem sap and aonla fruit juice having 3.5% and 8% TSS respectively with the ratio of 90:10 could be stored up to six months in glass bottle.

#### **7. Development of technology for utilization of banana peel for preparation of *sev***

Home-makers, processors and entrepreneurs are recommended to utilize ripe banana peel for preparation of *sev*. Ripe banana peel must be pre-treated immediately to prevent enzymatic browning by dipping in 2% salt (NaCl) solution along with 100 ppm ascorbic acid for 30 min.. After pre-treatment, banana peel must be blanched, grind to make paste and mixed (30% ripe banana peel paste) with gram flour (70%) for preparation of fibre rich *sev*. The recipe for the preparation of ripe banana peel based *sev* comprised of 30 g ripe banana peel paste, 70 g gram flour, 2.5 g common salt, 1.5 g chilli powder, 0.75 g white pepper powder, 1.0 g turmeric powder, 2.5 g coriander powder and 5 ml edible oil.

#### **8. Standardization of method for extraction of '*Noni*' (*Morinda citrifolia*) fruit juice.**

Processors and entrepreneurs are recommended to extract noni juice by treating crushed fruits with 0.1 % pectinase for 3 hours to get higher juice recovery. The juice after extraction must be filtered, pasteurized (96°C), packed in glass bottles followed by processing (96±1°C) for 30 min. The packed juice has storage stability for 12 months at ambient temperature.

#### **9. Standardization of the formulations for preparation of noni mango nectar from Noni juice**

Processors and entrepreneurs are recommended to utilize noni juice for preparation of blended noni mango nectar to increase the acceptability of noni juice. For preparation of blended noni mango nectar, blend 5% noni juice with 15% mango pulp by maintaining 16<sup>o</sup> Brix TSS and 0.3% acidity. The nectar after blending, filtered, pasteurized (96°C), packed in glass bottles followed by processing (96±1°C) for 30 min. The packed nectar has storage stability for 6 months at ambient temperature.

#### **10. Evaluation and modification of banana (*Musa paradisiaca* L.) comb cutter.**

The farmers and farm-labours doing banana cultivation are recommended to use safety cover (340mmx220 mm) along with comb cutter developed by ICAR-CIPHET for separation of comb from banana bunch.

#### **11. Standardization of the recipe for the preparation of jam from the fruits of Palmyra palm**

Home Makers, processors and entrepreneurs are recommended that jam from tender fruits of palmyra palm can be prepared by using pulp:sugar ratio (1:1.2) and addition of pectin



16g/kg of pulp and it also can be stored for six months at ambient temperature in glass bottle.
<p><b>12. Standardization of the recipe for the preparation of jelly from the <i>neera</i> of Palmyrah palm</b></p> <p>Home Makers, processors and entrepreneurs are recommended that jelly from the <i>Neera</i> can be prepared by using pectin 13 g/kg of <i>Neera</i> and can be safely stored for six months. Recipe should be <i>Neera</i>: sugar (1:1.1), 0.5% acidity (50 g citric acid per kg of jelly) and pectin. Boil the mixture till 68°Brix followed by hot filling in to glass bottle.</p>
<p><b>13. Standardization of the recipe for the preparation of candy from the fruits of Palmyra palm</b></p> <p>Home Makers, processors and entrepreneurs are recommended that, candy from the fruits of Palmyra palm can be prepared by steeping the slices (5cm x 5mm) in sugar syrup having 65% TSS for 8 hours followed by drying of slices for 7 hours at 65°C and packed in PE pouches can be stored successfully up to six month at ambient storage.</p>
<p><b>14. Development of technology for dehydration of onions rings.</b></p> <p>Red onions rings can be dehydrated by pre-treating onion rings with combination of 2000 ppm potassium meta-bisulphite (KMS) and 500 ppm citric acid for 15 minutes followed by dehydration at four stage dehydration temperatures (75, 70, 65 and 60°C for 2 hours, 2 hours, 1 hour and about 8 hours till drying, respectively).</p>
<p><b>15. Development of technology for dehydration of okra slices.</b></p> <p>Okra slices can be dehydrated by pre-treating okra slices with combination of 1500 ppm KMS and citric acid @ 500 ppm for 15 minutes following two stage dehydration temperatures (75 for 2 hours and 65°C for about 10 hours till drying).</p>
<p><b>16. Development of technology for dehydration of cauliflower segments.</b></p> <p>Cauliflower cut segments can be dehydrated by pre-treating cauliflower cut segments with combination of 1500 ppm KMS and 1000 ppm citric acid for 15 minutes following four stage dehydration temperatures (75, 70, 65 and 60°C for 2 hours, 2 hours, 1 hour and about 7 hours till drying, respectively).</p>
<p><b>17. Standardized technology for preparation of unripe banana (<i>Musa paradisiaca</i> L.) powder for commercial adoption.</b></p> <p>Unripe banana slices (2 mm thick) of variety Grand naine can be dehydrated by blanching in water at 70°C for 1 min followed by treatment 1000 ppm Potassium Metabisulphite+2000 ppm Citric Acid solution by dipping for 30 min and dried in a tray dryer at a temperature of 60±2 °C till a final moisture content of 3±1%.</p>
<p><b>18. Standardized technology for preparation of dehydrated green chilli powder.</b></p> <p>Green chilli pieces (2 cm) can be dehydrated by blanching in water at 90°C for 3 min followed by pretreatment with 2000ppm Sodium Metabisulphite solution dipping for 30 min and dried in a tray dryer at temperature of 60°C for 18 hours.</p>

## **(B) ONGOING DEPARTMENTAL RESEARCH PROJECTS under AGRESCO**

<b>Sr. No</b>	<b>Title of the experiment</b>	<b>B.H. No.</b>	<b>Name of the PI</b>	<b>Name of the Co-PI</b>
1.	Standardization of technology for foam	12935	Dr. Dev Raj	Mr J M Patel, Dr

	mat dehydration of mango for powder making			Harish Suthar, Dr Y N Tandel Ahmad
2.	Standardization Of Suitable Formulation For Preparation Of Instant Mango Milk Shake Powder	12028	Dr. Dev Raj	Mr J M Patel, Dr Y N Tandel,
3.	Packaging studies of freshly roasted immature sorghum ' <i>Sorghum Bicolor</i> ' seed ( <i>Pauk</i> )	12940	Er PS Pandit	FM Sahu and Harish Suthar
4.	Packaging and storage studies of drumstick ' <i>Moringa Oleifera</i> ' and its pulp	12940	Er PS Pandit	Harish Suthar
5.	Design of Card Board box for packaging of Kesar Mango	12940	Er PS Pandit	-
6.	Development of technology for processing and value addition of <i>Aloe vera</i>	12935	Dr. Dev Raj	Er AK Senapati
7.	Development of technology for processing and value addition of 'Noni' ( <i>Morinda citrifolia</i> )	12935	Dr. Dev Raj	Mr JM Mayani and AK Senapati
8.	Standardization of technology for foam mat dehydration of sapota for powder making	12935	Dr. Dev Raj	Mr JM Mayani and Mr J M Patel
9.	Drying Kinetics of Fresh and Osmotically Pre-treated Star Fruit ( <i>Averrhoa carambola</i> L.) slices.	12935	Er FM Sahu	Dr Dev Raj, Er AK Senapati, and Er PS Pandit
10.	Development of process for preparation of the aonla candy	12935	Dr Dev Raj	Mr JM Patel, Er FM Sahu
11.	Evaluation of Nisin for Biopreservation of Mango Nectar	12935	Dr Harish Suthar	Dr Dev Raj
12.	Development of UV light assisted method for preservation of processed products	12935	Dr Dev Raj	Mr JM Patel, Dr Harish Suthar
13.	Processing And Value Addition Of Watermelon [ <i>Citrullus lanatus</i> ]	12935	Dr Dev Raj	Mr JM Patel, Dr Harish Suthar
14.	Standardization of technology for preparation of Aloe vera based vermicelli	12935	Dr Dev Raj	Mr JM Patel, Dr Nilam V Patel
15.	Development of technology for health based digestive tablets from noni pomace powder.	12935	Mr J M Mayani	Dr. Dev Raj, Dr. NV Patel,
16.	Standardization of technology for preparation of candy from ripe papaya ( <i>Carica papaya</i> Linn.) fruits.	12137	Dr. Nilam V. Patel	Mr J M Mayani, Dr. Dev Raj, and Dr TA Ahlawat
17.	Standardization of technology for minimal processing of fresh cut potatoes ( <i>Solanum tuberosum</i> L.).	12940	Dr. Nilam V. Patel	Mr J M Mayani, Dr. Dev Raj,
18.	Standardization of technology for minimal processing of fresh cut cauliflower ( <i>Brassica oleracea</i> var. botrytis L.).	12940	Dr. Nilam V. Patel	Mr J M Mayani, Dr. Dev Raj,

### C) PRODUCTION OF PROCESSED PRODUCTS OF FRUITS AND VEGETABLES

Production during 2016-17 (Item wise quantity)	
Mango Nectar = 6204 bottle (200ml) Pineapple Nectar = 7905 bottle (200ml) Guava Nectar = 4390 bottle (200ml) Orange Drink = 2912 bottle (200ml) Mango Squash = 192 bottle (750ml) Pineapple Squash = 220 bottle (750ml) Guava Squash = 242 bottle (750ml) Orange Squash = 165 bottle (750ml) Aonla Appetizer = 49 bottle (750ml) Mango Jam = 31 bottle (500g) Mix fruit Jam = 61 bottle (500g) Tutti Fruity = 181 bottle (500g)	Noni Juice = 428 bottle (200ml) Tomato Ketchup = 200 bottle (1000g) Mango Pulp = 424 bottle (1000ml) Mango Pulp = 1671 Tin can (850ml) Aonla Candy = 45 Packet (100g) Mango Panna = 45 bottle (750ml) Mango Pickle = 27 bottle (500g) Lemon Pickle = 28 bottle (500g) Papaya chutney = 30 bottle (500g) Aonla chutney = 20 bottle (500g) Tomato chutney = 8 bottle (500g)



**Commercial products prepared in PHT under ELP at NAU**

## ❖ EXTENSION SERVICES

- ❖ Participation in *Krishi Mahotsava*- a flagship programme of GoG.
- ❖ Organizing vegetable exhibition-cum-competition, Farmers' training, *shibir* etc.
- ❖ Diagnostic visits at farmers' fields.
- ❖ Dissemination of technology through publications.
- ❖ TV telecast and radio talks on various aspects of vegetable crops.
- ❖ "*Mera Gaon Mera Gaurav*" programme related activities.

## TRANSFER OF TECHNOLOGY (ToT)



**Hon'ble Chief Minister, Smt. Anandiben Patel visit to PHT stall in Krushi Mela**



**Visit of Hon'ble State Agriculture Minister, Sh. Jasabhai Barad**



**Hon'ble Vice Chancellor, Dr. C.J. Dangaria with Director, CTRD viewing Hot water treatment**







**Visit of students of other University to department of PHT**



**Training programme of Horticulture Officers at NAU by PHT**



**National seminars for TOT to farmers**



**Exhibition cum sale of the processed products in the Krishi Mahotsav**



**Training of women through ATMA Project at Centre of Excellence on PHT**

## Infrastructure Available

Department has excellent facilities for Teaching, Research & Development and Extension pertaining to Post Harvest Technology of Horticultural crops. Department of Post Harvest Technology has following facilities for Teaching, Research & Development and Extension:

- Food Product R&D Laboratory
- Quality Control Laboratory
- Food Microbiology Laboratory
- Sensory Laboratory
- Post Harvest Physiology and Packaging Laboratory
- Post Harvest Engineering laboratory
- UG Laboratory
- Computer Net-Working Laboratory
- Seminar / conference Room well equipped with e- teaching aids

### **FACILITIES AVAILABLE IN LABORATORIES**

Autoclave	Blade Mixer	Blanching Tank
BOD Incubator	BOD Portable Meter	Bomb Calorimeter
Box Compression Tester	Box Drop Tester	Bulk Density Meter
Bursting Strength Meter	CFFB Box Penetrometer	COD Portable Meter
Colorimeter	Colony Counter	Deep Freezers
Digital pH Meter	Digital Refractometer	Digital Vernier Caliper
Double Seamer	Extruder	Fermenter
Filter Press	Flanger Hand	Freeze Dryer (lyophilizer)
Gas Analyser	Homogenizer	Hot Air Oven
Hot water Treatment Plant	Hydraulic Juice Press	Ice Flaking Machine
Incubator Shaker	Infrared Dryer	Infrared Moisture Balance
Kjeldal Distillation	Laminar Air Flow	Mechanical Dehydrator



Apparatus		
Microscope with Camera	Microwave Oven	Moisture Analyser
Multiparameter Meter	N <sub>2</sub> Estimation Apparatus	Online Data Logger
PE gauge Meter	Pulveriser	Reformer
Refrigerated Centrifuge	Rheometer	Rotary Flat Can Body
Shrink wrapped Machine	Size Grader	Spectrophotometer
Texture Analyser	Vacuum Dryer	Vacuum Packaging Unit
Vibration Testing Machine	Water activity Meter	Water Vapour Transmission Rate Meter
Waxing Machine	Weighing Balance	Weight Grader
PCR - Thermo cyler	Electrophoresis Unit	Emulsifier
Flame Photometer	Mini-centrifuge	Magnetic stirrer

### ADDITIONAL EXCELLENCE INFRASTRUCTURE

- ✓ **Centre of Excellence on Post Harvest Technology**
- ✓ **Mango and Tomato Processing Plant having capacity of 500 kg per 8 hours**
- ✓ **Onion Dehydration Plant having capacity of 2 tonnes per 8 hours**
- ✓ **Juice Processing Line having capacity of 50 litre per hour**
- ✓ **Banana Processing Plant**
- ✓ **Low Temperature Storage Structure having 20T capacity**
- ✓ **Pre-Cooling Unit having 2.5T capacity**
- ✓ **Fruit Ripening Chambers having 6T capacity**
- ✓ **Controlled Atmosphere Storage Unit having 3T capacity**
- ✓ **R.O. Water filtration Unit having 1200 L/h capacity**
- ✓ **Freeze Drying Unit**
- ✓ **Heavy duty Spray Dryers**
- ✓ **Packaging Infrastructure**





Packaging Laboratory



Sensory Laboratory



Food Microbiology Laboratory



Conference hall



Mango Processing Plant



Dehydration Plant



Tomato and Mango processing in pilot plant at PHT, NAU



## Dignitaries Visit: Glimpses



Visit of Hon'ble Union Agriculture Minister (GOI) along with higher authority to Department



Dr SK Sharma, Former Director Research, YSPUHF and Former Director, CIAH, Bikaner



Visit of Principal Secretary (Agriculture) GOG along with higher authority



Visit of Foreign Delegates to PHT

## PEER REVIEW TEAM OF ICAR: GLIMPSES



**Visit of ICAR Accreditation Team to the Department of PHT**

## Other activities



**Swachhata Abhiyan at Department of PHT**



**Exposure visit of School Students to PHT**