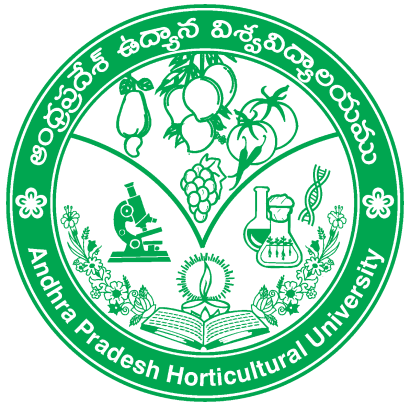
APHU 2030

Vision & Perspective Plan

Andhra Pradesh Horticultural University

Venkataramannagudem, West Godavari District – 534 101, A.P.


ADMINISTRATION BUILDING
Andhra Pradesh Horticultural University
Venkataramannagudem



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Dr. S.D. Shikhamany
VICE - CHANCELLOR
Andhra Pradesh Horticultural University
Administrative Office, DCC Bank Buildings
P.O. Box No. 7, Tadepalligudem-534 101, W.G. Dist., A.P.
Phones : 08818-222191, Fax : 08818-222190,
EPABX : 08818-222395, E-mail : vcaphu@gmail.com,
vc@aphu.edu.in, URL : www.aphu.edu.in

Compiled and Edited by

Dr. B. Srinivasulu, Controller of Examinations, APHU
Dr. K.V. Sheshadri, Director of Extension, APHU
Dr. P. Suryanarayana Reddy, Registrar, APHU
Dr. K.Purushotham, Director of Research, APHU
Dr. D.V. Raghava Rao, Dean of Horticulture, APHU
Dr. K.Haribabu, Dean of Student Affairs, APHU

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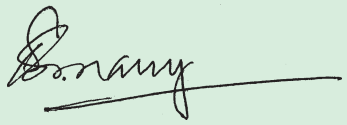
Preface

In Andhra Pradesh, several horticultural crops are grown on a commercial scale in all the three regions and provide livelihood to millions of farmers in the state. Horticulture contributes to about 4 per cent of the state GDP. Horticultural crops cover 13% of the gross area in the state. The area under Horticulture is 19.06 lakh ha. with an annual production of 191.42 lakh tonnes. Andhra Pradesh with high geographical diversity, 9 agro-climatic zones, varied soil types and good irrigation resources is better placed in the production of various horticultural crops such as fruits (8.18 lakh ha; 104.95 MT), vegetables (2.51 lakh ha; 42.1 MT), plantation crops (3.48 lakh ha; 3.5 MT), spices (3.36 lakh ha; 11.8 MT), flowers (0.21 lakh ha; 1.16 MT) and medicinal and aromatic plants (0.09 lakh ha; 0.13 MT). Andhra Pradesh ranks first in the production of mango, chillies, turmeric, sweet orange and papaya. Coconut, oil palm and cashew are important plantation crops. Mango, sweet orange and banana are the leading fruit crops of Andhra Pradesh and accounts for over 86% of the area under fruit crops and over 77% of the total production. Tomato, brinjal and *bhendi* are the major vegetables grown in the state. Among the spices, Andhra Pradesh ranks first in area and production of chillies and turmeric. Rose, jasmine, crossandra, chrysanthemum, marigold, tuberose are the traditional flower crops of the state.

The Andhra Pradesh Horticultural University was established by the Government of Andhra Pradesh with its headquarters at Venkataramannagudem, near Tadepalligudem in West Godavari District on 26.6.2007. It is the second Horticultural University in the country. The university has the mandate for research, education and extension related to horticulture and allied subjects. This university offers B.Sc. (Hons.) Horticulture, M.Sc. (Horticulture), Ph.D (Horticulture) and two year Diploma in Horticulture. The university at present has 4 Horticulture colleges, 5 polytechnics and 28 research stations located in 9 agro-climatic zones of the state.

The "APHU 2030 Vision and Perspective Plan" document has been prepared by synthesizing the valuable inputs obtained from teaching institutions, research and the extension functionaries as well as those connected with university administration. The document discusses relevance of education, research and extension programmes of the University. An important component of the exercise is the impact assessment of teaching, research and extension programmes of the University. In the field of education, the need for imparting education, which is relevant to the present day needs and the expectations of the users, is discussed. In the area of research, detailed discussion, commodity wise and discipline wise, has been attempted keeping in view the growth engines identified in the vision 2020 document of the State, as also the future requirements as perceived by the University. The need for strengthening the extension infrastructure and the future role to be played by the University in the dissemination of horti-technologies based on research findings has been outlined exclusively.

I am thankful to Dr. B. Srinivasulu, Controller of Examinations, Dr. K.V. Sheshadri, Director of Extension, Dr. P. Suryanarayana Reddy, Registrar, Dr.K.Purushotham, Director of Research, Dr. D.V. Raghava Rao, Dean of Horticulture, Dr. K.Haribabu, Dean of Student Affairs for assisting me in bringing out this document.



Tadepalligudem
July 5, 2010

(S.D.SHIKHAMANY)
Vice-Chancellor, APHU

EXECUTIVE SUMMARY

After attaining self sufficiency in food production through green revolution, India is marching ahead with nutritional security of the ever growing population to provide enriched and fortified foods with fruits and vegetables coupled with natural therapeutics through medicinal and aromatic plants and to release the mental pressure by spending in beautiful gardens which is only possible through revolutionizing horticultural industry**.** India's share in world's fruit production is about 10% with 49.295 million metric tons. The impact of enhanced investment in horticulture is encouraging in terms of vastly improved qualitative and quantitative production to meet local and export demands.

Andhra Pradesh stands first in the production and productivity of mango, sweet orange, acid lime, oilpalm, chillies, turmeric etc., and first in productivity of papaya and grape. Further India is the fourth largest producer of coconut .Other important horticultural crops in the state are cashew, banana, guava, sapota, onion, tomato, bhendi etc. Horticulture is and will continue to be a major contributor to the economy of Andhra Pradesh and the country. The seed, fertilizer, pesticides, horti-product manufacturing, processing and marketing sectors generate additional employment opportunities. Realizing the importance of this most crucial sector of the economy, the vision 2020 document of the State of Andhra Pradesh has acceded prime importance for the development of agriculture. The document envisages an overall growth rate of 5.7 per cent and has identified six major "growth engines" for the sector. These are rice, horticulture, poultry, fisheries, dairy and agro industries. It is needless to say that the technological back up and research support should be provided by the sole Horticultural University in the state. This expectation is reasonable considering the mandate of the State Horticultural University, which was established to provide research and development support, generate the needed human resource and to assist in the process of technology transfer from the laboratories and research stations to the farmers of the state and vice-versa.

Strategic planning is not a new concept in the Indian context. The five-year plans of the union and state governments were evolved as medium term planning exercises with specific target and development objectives. However, a planning process with a long-term perspective of twenty years has not been on the anvil in a number of organizations. The Indian Council of Agricultural Research suggested that the State Agricultural Universities and Research Institutes and Project Directorates functioning under the council may evolve a strategic planning document taking into consideration the strategy, core competencies of the organizations and the needs of the different agro-climatic regions in which they are located in particular, and the country as a whole. The strategic plan documents of ICAR are now very familiar as the VISION 2020 and being newly formed university hardly with two years age has prepared the document, outlining the short term and long term prospective in education, research and extension for 2030 A.D in consonance with the state's objectives and long term perspective time span of twenty five years. The document has been prepared by synthesizing the valuable inputs obtained from teaching institutions, research and the extension functionaries as well as those connected with university administration. The vision 2030 document of APHU has been prepared to include, as the principal components, a profile of the state of Andhra Pradesh. Institutional growth outlining the infrastructure, human resources, organizational set up, finances and salient achievements. Continuing further, the document discusses relevance of education, research and extension programmes of the University. An important component of the exercise is the impact assessment of teaching, research and extension programmes of the University. These components of the document provide a backdrop of the University's organizational set up, activities and achievements. The current scenario follows this and SWOT analysis of the State's horticultural situation and the University. The next major item of discussion is the perspectives dealing with current status and the emerging scenario of the

horticultural situation in the state, detailed discussion of the Vision 2030 document of the state and the visualization of the role of the University to assist the state in realizing its objectives.

The crucial part of the document is critical discussions on ISSUES and STRATEGIES wherein a critical analysis of the future needs of state and strategies to meet these requirements are outlined.

In the field of education, the need for imparting education, which is relevant to the needs and the expectations of the users, is discussed. This calls for measures such as changes in existing course curricula, introduction of new undergraduate and post-graduate courses and adoption of new and emerging technologies such as distance learning, information technology based instruction, video conferencing and training of students in horti-based industries, financial institution, trade and export promotion organizations.

In the area of research, detailed discussion, commodity wise and discipline wise, has been attempted keeping in view the growth engines identified in the vision 2020 document of the State, as also the future requirements as perceived by the University.

The need for strengthening the extension infrastructure and the future role to be played by the University in the dissemination of horti-technologies based on research findings has been outlined exclusively. The University may have to play an increasingly pro-active role to make the extension strategies and initiatives more effective.

The other items of interest discussed in the document are risk analysis, expected spin-offs from the strategic planning process, need for monitoring and evaluation of the programmes and initiatives undertaken.

As educational institutions have to progressively decrease their dependence on funding from governments, probable means of obtaining the needed funds from alternative sources have also been outlined.

The State's horticulture is on the move and exhibited the capacity to effectively absorb the improved technologies and knowledge generated. The farmers of the state are extremely resilient, Progressive, hard working, enthusiastic and entrepreneurs. They have taken the state forward and need all the support to adopt improved technologies to improve their economic status and prosperity through horticultural farming.

The University is having an infrastructure of Four constituent colleges, five polytechnics, 28 research stations. Strategies for enabling these teaching, research and extension units are discussed including the need to strengthen library and information services, student housing and recreational facilities, laboratories, livestock farms and workshops. The University would like to utilize this document as a major guiding force for planning and implementing its future academic, research and extension activities and programmes.

A strategic planning process involves aspects such as current needs and future requirements. The future component is dependent on several interacting factors and forces which ultimately decide the achievability of the objectives. This attempt is, however, made considering the emerging situation to develop as realistically as possible. This is one reason why it is considered that the objectives outlined in the document for the next two and a half decades may be achievable, in which case the exercise may prove to be rewarding.

1. PREAMBLE

In Andhra Pradesh, several horticultural crops are grown on a commercial scale in all the three regions and provide livelihood to millions of farmers in the state. Horticulture contributes to about 4% of the state GDP. Horticultural crops cover 13% of the gross area in the state. The area under Horticulture is 19.06 lakh ha. with an annual production of 191.42 lakh tonnes. Andhra Pradesh with high geographical diversity, 9 agro-climatic zones, varied soil types and good irrigation resources is better placed in the production of various horticultural crops such as fruits (8.18 lakh ha; 104.95 MT), vegetables (2.51 lakh ha; 42.1 MT), plantation crops (3.48 lakh ha; 3.5 MT), spices (3.36 lakh ha; 11.8 MT), flowers (0.21 lakh ha; 1.16 MT) and medicinal and aromatic plants (0.09 lakh ha; 0.13 MT). Andhra Pradesh ranks first in the production of mango, chillies, turmeric, sweet orange and papaya. Coconut, oil palm and cashew are important plantation crops. Mango, sweet orange and banana are the leading fruit crops of Andhra Pradesh and accounts for over 86% of the area under fruit crops and over 77% of the total production. Tomato, brinjal and *bhendi* are the major vegetables grown in the state. Among the spices, Andhra Pradesh ranks first in area and production of chillies and turmeric. Rose, jasmine, crossandra, chrysanthemum, marigold, tuberose are the traditional flower crops of the state.

However, due to unprecedented changes in the climate, such as abnormal behaviour in the monsoons, wide fluctuations in temperatures, dwindling water resources and degradation of cultivated soil, there is a need to reorient our research programmes to meet these challenges particularly in horticultural crops, since many of them are perennial in nature. There is urgent need to refine and upgrade our technologies to convert the comparative advantage of Andhra Pradesh, being the largest producer of mango, citrus, papaya, oilpalm, chillies and turmeric to competitive advantage. Technologies to make our horticultural produce quality and cost competitive, meet the sanitary and phytosanitary stipulations and withstand long duration storage and long distance transport are the need of the day. There is also need to improve the nutritional and processing qualities of our produce. Realizing the need for rationalization of research and education, for commercialization and globalization of Horticulture in Andhra Pradesh and build a strong correlation and co-ordination between education, research and extension, the Andhra Pradesh Government under the leadership of the great visionary and the then Chief Minister Late Dr.Y.S.Rajasekhara Reddy established the Andhra Pradesh Horticultural University by carving it out from the Acharya N.G. Ranga Agricultural University through G.O.Ms.No.134, dt.26.06.2007.

1.1. Mission

The Andhra Pradesh Horticultural University, Venkataramannagudem established during the year 2007 with a mission to impart quality education and training in Horticulture to develop well trained personnel and to conduct basic, applied, location specific and anticipatory research for the overall development of horticultural crops in the state.

1.2. Vision

The horticulture scenario in the country, particularly in Andhra Pradesh, is rapidly changing. In the coming years a quantum jump in the population growth is expected and by 2030 the population of India would cross 150 crores, when the main challenge the country could face will be food and nutritional security. Andhra Pradesh Horticultural University as a part of nation with sharing responsibilities, programmes pertaining to horticulture must be planned with a vision to meet the challenges ahead.

- To develop human resources needed for Horticulture development.
- To refine and generate technology for sustainable and more profitable Horticulture.
- To meet the training needs of Horticultural industry.

2. MANDATE

- Train manpower through imparting education
- Conduct location specific research
- Organize extension activities for the benefit of personnel of line departments of the government, NGOs, farmers and others.

2.1. Objectives

- To develop Human Resources needed for horticulture and allied sectors like storage, processing, value addition etc. for the development of the state.
- To constantly refine and generate technologies for increasing production, processing and marketing of horticultural crops.
- To assist the Government, NGOs and line departments for transferring the improved technologies to the farmers.
- To promote international trade of fruits, vegetables, spices, flowers and processed food.

3. STATE SCENARIO

Andhra Pradesh (AP), covering a land area of 274,400 sq.km., with a population of 66.51 million (1991), is the fifth largest state in India, accounting for 9 and 8 per cent of the country's area and population, respectively. The State, in a sense, is regarded as a microcosm of the nation comprising agriculturally advanced and prosperous area in the coastal districts (9 districts), an economically and society backward area in Telangana (10 districts), a drought prone area in Rayalaseema (4 districts) and a fairly extended tribal belt, along the northern and north-eastern regions.

Andhra Pradesh State at a Glance 2007-2008

(in 000' ha)

Sl.No.	Particulars	2007-08
1.	Total geographical area	27,504
2.	Forest	6,210
3.	Barren and un-cultivable land	2,059
4.	Land put to Non-Agri. –Uses	2,637
5.	Cultivable waste	659
6.	Permanent Pastures and other grazing lands	571
7.	Land under misc. tree crops and groves not included in net areas sown	306
8.	Other fallow lands	1500
9.	Current fallow lands	2719
10.	Net area sown (including fish cultures)	10843
11.	Fish ponds	87
12.	Net area sown	10756
13.	Area sown more than once	2811
14.	Gross area sown	13567
15.	Cropping intensity (%)	1.26
16.	Gross area irrigated	6285
17.	Net area irrigated	4644
	Source	
18.	Canals	1610
19.	Tanks	585
20.	Wells	2287
21.	Other Sources	162
22.	Total net area irrigated	4644
23.	Net area irrigated to net area sown (%)	43.2
24.	Area irrigated more than once	1641
25.	Gross areas irrigated	6285
26.	Gross area irrigated to Gross area sown (%)	46.3
27.	Intensity of irrigation (%)	1.35

Approximately, 70% of the State's population is dependent on agriculture and allied sectors, which contributes bout 30% of the State's income. Andhra Pradesh is principally agrarian in character, consistently maintaining high levels of crop production, compared to several other Indian states.

3.1 Physiography

Andhra Pradesh has three major river basins (Krishna, Godavari and Pennar) and five other smaller ones, draining into the Bay of Bengal. The state has 972 km long coast line, generally even, along its eastern border, abutting the Bay of Bengal.

3.2 Soils

Andhra Pradesh is endowed with a wide variety of soils, ranging from less fertile poor coastal sands to highly fertile and productive deltaic alluvia (entisols/vertisols) of the Godavari, Krishna and Penna rivers, and the red (alfisol) and black (vertisol) soils, developed from different parent materials. The six major soil groups present in the state are: red soils (Alfisols) 65%, black soils (Vertisols) 25%, alluvial soils (Entisols & Vertisols) 5%, coastal sands (Entisols) 3%, laterite and lateritic soils (Oxisols) 1% and problem soils (Alfisols & Inceptisols) 1%, including saline, saline-alkali and non-saline-alkali soils.

Red soils occupy over 65% of the cultivated area and are mostly situated in Rayalaseema Districts. These soils have a low nutrient status. Red earths which are commonly termed as Red soils can be sub-classified as (a) Dubba soils (loamy sands to sandy loams) (b) Chalkas (Sandy Loam soils) (c) Sandy clay loams (d) Loams including silty soils (e) Deep loamy sands and (f) Sandy loams with clay subsoil. Chalkas occur mostly in the Telangana districts while red loams combined with sands are present in the upland regions of Coastal districts.

Black soils cover nearly 25% of the cultivated areas and are generally associated with poor drainage. They are also called as Regurs or Vertisols and are of two types. The first category is in-situ soils while the other one is transported soil. While the first category can be noticed in the Coastal districts and parts of Telangana and Rayalaseema, the second category occurs in the valley regions of the slopes with calcareous concentrations. The in-situ soils are generally heavy in texture and high in salt concentration.

The alluvial loamy clay soils found in Krishna and Godavari deltas cover 5% of the cultivated area. The coastal sands occupy only 3% while the remaining 1% is covered by laterite soils in certain pockets of the State.

3.3 Rainfall

Horticulture in Andhra Pradesh is mostly dependent on rainfall. Horticultural production depends upon the seasonal distribution of rainfall the normal annual rainfall of the State is 940m.m. In the State, major portion (66%) of rainfall is contributed by South-West Monsoon (June-Sept) followed by (24%) North-East Monsoon (Oct-Dec) the rest 10% of the rainfall is received during the winter and summer months.

The Normal rainfall distribution in the three regions of the State differs with the season and Monsoon. The influence of South-West Monsoon is predominant in Telangana region (716mm) followed

by Coastal Andhra (620 mm) and Rayalaseema (407 mm), where as the North-East Monsoon provides high amount of rainfall in Coastal Andhra area (324 mm) followed by Rayalaseema (238 mm) and Telangana (129 mm). There are no significant differences in normal distribution of rainfall during winter and hot weather periods among three regions.

The State receives major portion of its rainfall from South-West Monsoon. The season-wise decennial rainfall is as follows:

Sl.No	YEAR	South-West Monsoon			North-East Monsoon including Winter and Hot Weather period			Total Rainfall (in mm)		
		Normal	Actual	% dev	Normal	Actual	% dev	Normal	Actual	% dev
1.	1966-67	600	643	7	290	305	5	891	947	6
2.	1976-77	602	673	-12	293	352	20	895	1025	15
3.	1986-87	602	597	-1	294	271	-8	896	868	-3
4.	1996-97	634	737	16	291	373	28	925	1109	20
5.	2005-06	624	690	11	316	457	45	940	1147	22
6.	2006-07	624	627	0.5	316	231	-27	940	858	-9
7.	2007-08	624	747	+20	316	333	+5	940	1080	+15
8.	2008-09*	624	666	+7	274	149	-45	898	815	-9
	* from 1.6.2008 to 1.4.2009									

By virtue of its location and climate, Andhra Pradesh represents a transition from tropical to sub-tropical zone of the country. The climate is predominantly semi-arid to arid, except for the coastal region on the east coast, which has humid to sub-humid climate. The meteorological seasons identified are:

i.	Hot water (summer)	:	March to May
ii.	South-West monsoon	:	June to September
iii.	North-East monsoon	:	October to December
iv.	Winter	:	December to February

The rainfall of Andhra Pradesh is influenced by both south-west and north-east monsoons. The average rainfall of the state is 940 mm, varying from about 520 mm in Ananthapur District to 1160 mm in Vizianagaram and East Godavari districts. In some years, Srikakulam, Vizianagaram, East Godavari, Adilabad and Khammam districts have recorded 1400 to 1500 mm rainfall.

The distribution of annual rainfall in the state as a whole is about 69% during south-west monsoon, 22% during north-east monsoon and 9% during winter and hot weather months.

The mean annual rainfall in coastal region varies from 750 to 1160 mm, of which 700 mm (approximately 59%) is received during the south-west monsoon, except in Nellore District which receives only 30% rain from the south-west monsoon. Most of the Rayalaseema region gets 300 to 400 mm of rain during the south-west monsoon season, accounting for 40 to 70% of its annual rainfall. More than 80% of the rain in Telangana region is received during the south-west monsoon season.

3.4 Socio-Economic Characteristics

Andhra Pradesh has a population of 66.51 millions (33.73 million males and 32.78 million females) in 1991 as against 53.55 million in 1981 – a decennial growth rate of 24.2%. The state is one of the most populous in the country with 7.9% of the India's total population (838.6 million) residing in the state. There were 972 females per 1000 males as per 1991 census, with literacy of 32.7% among females and 55.1% among males. The rural population, which was 80.7% in 1971 and 76.7% in 1981 decreased to 73.1%, indicating large migration of people from rural to urban areas.

3.4.1 Land Holding Pattern

The state has registered a significant increase in the number of farm holdings from 6.14 million in 1976-77 to 8.23 million during 1986-87 and 9.29 million during 1990-91. Nearly 56.1 per cent of these holdings are less than 1 ha, while 21.2 per cent of the holdings had between 1 and 2 ha land during 1990-91. The average size of the holding decreased from 2.34 ha in 1976-77 to 1.72 ha during 1986-87 and further to 1.56 ha during 1990-91. the consistent increase in land holdings over the years indicates fragmentation of cultivable land.

3.5 Irrigation

The state is endowed with a variety of natural resources for irrigation and is popularly known as the "River State" of Southern India. The important rivers which are harnessed for irrigation include Godavari, Krishna, Pennar, Thungabhadra, Vamsadhara and Nagavali.

The canal systems of the rivers Godavari and Krishna, Pennar barrage, Kurnool-Cuddapah Canal (K-C canal) and the river valley projects like Nagarjunasagar, Sriramsagar, Srisailam, Thungabhadra, Musi, Kadem and Nizamsagar together with 85221 tanks, 2.17 lakh tube wells, filter points and 1.283 million other wells irrigated a gross cropped area of 5.16 million hectares during 1997-98, accounting for 42.5% of the gross cropped area of the state under irrigation.

The crop-wise irrigated area varies from 98.8% in sugarcane, 96.4% in rice, 96.2% in turmeric, 68.2% in chillies to 18.9% in cotton. In terms of utilization of irrigation water, rice accounts for 65.4%, sugarcane 6.5%, groundnut 6.5% and all other crops using the remaining potential (1997-98).

The total ground water reserves in the state are estimated to be 4.3 million hectare metres, out of which the present exploitation is 1.00 million hectare meters, through dug wells and tube wells mainly in the river basins. This leaves a balance of 3.30 million hectare metres of exploitable ground water potential which can bring at least another two million hectares under assured irrigation, subject to availability of power for lifting of ground water.

As against the present gross irrigated area of 5.16 (1997-98) million ha, the ultimate irrigation potential of the state is estimated at 11.3 million hectare meters (7.8 million hectare meters surface irrigation +3.5 million hectare meters ground water irrigation).

Irrigation Intensity

The irrigation intensity ie., the ratio of gross irrigated area to net irrigated area is 1.35 in 2007-08, where as it was 1.36 in 2006-07.

3.6 Land use pattern

Out of the total geographical area of 27.44 million ha, only 36.2% (9.93 million ha) was cropped during the year 1997-98. Nearly 60% of the geographical area is under various other uses including forests (22.6%) and waste lands (41.44%). The gross cropped area is 121.35 million ha and the cropping intensity is 123.3%.

3.7 Agro-Climatic Zones

The state is divided into the following 7 agro-climatic zones based on rainfall characteristics, irrigation potential, soil types and cropping pattern.

- Krishna-Godavari Zone – comprising the districts of West Godavari, Krishna, Guntur and parts of East Godavari (excluding uplands), Khammam, Nalgonda and Prakasam.
- North-Coastal Zone – consisting of most parts of Srikakulam, Vizianagaram, Visakhapatnam districts and uplands of East Godavari District.
- Southern Zone – including the districts of Nellore, Chittoor, southern parts of Prakasam and Kadapa and eastern parts of Ananthapur District.
- Northern Telangana Zone – consisting of the districts of Adilabad, Karimnagar, Nizamabad, Medak (except western portion), north-eastern tip of Nalgonda and most parts of Khammam and Warangal.
- Southern Telangana Zone – comprising the districts of Hyderabad, Ranga Reddy, Mahaboobnagar (except southern border), Nalgonda (except eastern part), north-western and southern parts of Warangal.
- Scarce Rainfall Zone – include the districts of Kurnool, Ananthapur (except south-eastern part), western parts of Prakasam, southern part of Mahaboobnagar and north-western parts of Kadapa.
- High Altitude and Tribal Areas Zone – covering areas lying along the Srikakulam, Vizianagaram, Visakhapatnam, East Godavari and Khammam districts.

3.8 Crops and cropping pattern

Cropping Intensity

Cropping intensity is one of the indices for assessing the efficiency of crop agriculture sector. The cropping intensity i.e., the ratio of gross area sown to net area sown is 1.26 in 2007-08. The level of cropping intensity move in consonance to the behavior of the monsoon and availability of irrigation water.

Area and production of major Horticultural crops in Andhra Pradesh (2007-08)

S. No	Crop/Year	2007-08	
		Area (Hec.)	Production (M T)
I.	**Fruits**		
1.	Mango	483480	4157928
2.	Orange & Batavia	194395	2624333
3.	Lemon (Lime & Other Citrus fruits)	58866	882990
4.	Banana	75177	2631195
5.	Sapota	18731	187310
6.	Papaya	14945	1195616
7.	Guava	9626	144390
8.	Pomegranate	4893	44037
9.	Grapes	2764	58044
10.	Custard apple	933	5598
11.	Other Fruits	6159	61590
	Total Fruits	**869969**	**11993031**
II.	**Plantation Crops**		
12.	Coconut	120547	1570
13.	Cashew	166163	112964
14.	Oilpalm	77329	423974
15.	Cocoa	14061	2531
16.	Arecanut	375	600
	Total Plantation crops	**348552**	**350541**
III.	**Tuber Crops**		
17.	Tapioca	17877	357540
18.	Potato	6637	132740
19.	Sweet potato	697	13940
	Total Tuber Crops	**25211**	**504220**
IV.	**Vegetables**		
20.	Tomato	74108	1408052
21.	Onion	35645	605965
22.	Brinjal	26564	531280
23.	Bhendi	29315	439725
24.	Beans	26146	313752
25.	Bottle Gourd	1497	19287
26.	Greens	12173	121730
27.	Cabbage and knol-khol	8953	134295
28.	Carrot	4854	88925
29.	Cucumber	7364	147280
30.	Other Gourds	20041	300615
31.	Peas	113	3955
32.	Others	26935	323220
	Total Vegetable Crops	**273708**	**4438081**

S. No	Crop/Year	2007-08	
		Area (Hec.)	Production (M T)
V.	**Spices & Condiments**		
33.	Chillies	18916	556190
34.	Turmeric	67388	417806
35.	Coriander	26530	31836
36.	Tamarind	6099	46962
37.	Ginger	25825	1640
38.	Ajwan	4013	2007
39.	Garlic	1591	15910
40.	Pepper	271	420
	Total Spices & Condiments	**150633**	**1072771**
VI.	**Flowers**		
41.	Chrysanthemum	2449	28164
42.	Crossandra	3084	9868
43.	Jasmine	4880	24400
44.	Marigold	4200	31502
45.	Rose	849	2546
46.	Lily	49	1054
47.	Gladiolus	12	30
48.	Other flowers	844	9284
	Total Flowers	**16367**	**106848**
VII.	**Medicinal and Aromatic Plants**		
49.	Cholorophytum (safed musli)	56	39
50.	Palma Rosa	294	88
51.	Lemon grass	1492	498
52.	Citronella	887	176
53.	Annato	320	450
54.	Coleus	668	1268
55.	Aswangandha	220	220
56.	Amla	4991	9982
57.	Other Medicinal Plants	210	420
58.	Other Drugs	15206	152060
	Total Medicinal and Aromatic Plants	**24344**	**165201**
Total Fruits, Vegetables, Spices, Flowers, Medicinal & Aromatical Plants etc.		**1785058**	**16365228**

Dryland horticulture is another feature which is gaining ground slowly. Oilpalm is one specific crop which is gaining ground in the coastal districts of the State. The area under oilpalm has been increasing steadily and stands currently at 50,000 ha against the identified potential of 5.0 lakh ha.

The average annual growth rates in area, production and yield of different crops during the past one and half decades are presented.

Increase in Area, Production and Yield of different Horticultural crops between 1998-1999 to 2007-2008

Crop	Area (ha)	Production (mt)
I. Fruits		
Mango	201,566	1888357
Orange & Batavia	1904890	1988750
Lemon (Lime & other Citrus fruits)	23895	569070
Banana	38292	1710270
Sapota	13930	130751
Papaya	13598	1089824
Guava	-1030	-46237
Pomegranate	4893	44037
Grapes	1000	13019
Custard Apple	933	5598
Other Fruits	6159	61590
Other (Fresh)	537	20703
Other (Dry)	24	630
II. Plantation Crops		
Coconut	22374	560489
Cashew	28076	-25860
Oil Palm	47456	-7411.7
Cocoa	14061	2531
Betelvine	-939	56584
Arecanut	166	574.01
III. Tuber Crops		
Tapioca	-3717	322251
Potato	5090	107965
Sweet Potato	-20897	-21349
IV. Vegetables		
Tomato	-22971	-647122
Onion	4588	107990
Brinjal	13793	346525
Bhendi	3901	188048
Beans	15159	277156.5
Bottle Gourd	342	2545
Greens	5131	72641
Cabbage and Knol-Khol	7338	102544
Carrot	4854	88925
Cucumber	1207	60196
Other Gourds	11963	225811
Peas	-92	2731
Others		296285
V. Spices & Condiments		
Chillies	-3341	30780
Turmeric	67388	417806
Coriander	-54963	-184709
Tamarind	1225	-18430.5
Ginger	23373	-12923
Ajowan	4013	2007
Garlic	901	12284
Pepper	271	407
VI. Flowers		
Chrysanthermum	-108	-35761
Crossandra	1391	8597
Jasmine	2365	9310
Marie Gold	1721	-5683
Rose	4045718	-6897454
Tubersose		
Lily	-131	-1106
Gladiolus	-13	-2499970
Other Flowers	844	9284
VII. Medicinal and Aromatic Plants		
Chlorophytumi.e	56	39
Safed Musli		
Palma Rosa	294	88
Lemon grass	1492	448
Citronella	887	177
Annato	320	450
Coleus	668	1269
Aswagandha	220	220
Amla	4991	9982
Other Medicinal Plants	210	420
Other Drugs	15206	152060

3.9 Agri (Horti)-Exports

Export earnings from agro-based products which were around Rs.1734 million in 1987-88 rose to Rs. 25753.6 million by 1999-2000. At the same time the export earnings from animal and marine products increased from Rs.608.3 million to Rs.9624 million. However, the incidence of diseases of prawns has hit the export of aqua products. Likewise, in the field of spices, chillies have been one of the major items of export along with oilseed extractives. But the contamination of chillies with pesticides and afflotoxins of oil extractives are coming in the way of export of these products. Mango exports are also adversely affected due to various reasons, principally because of the improper harvesting and post-harvest handling and processing. If these problems are tackled, the state can emerge as one of the principal exporters of agro-based products.

4. ANDHRA PRADESH HORTICULTURAL UNIVERSITY SCENARIO

4.1. Brief History of APHU

The Andhra Pradesh Horticultural University was established by the Government of Andhra Pradesh by Act 30 of 2007 with its headquarters at Venkataramannagudem, near Tadepalligudem in West Godavari District. It is the second Horticultural University in the country. Andhra Pradesh being the leader in the production of mango, oil palm, chillies, turmeric, sweet orange, papaya and second largest producer of total fruits and spices, richly deserves a Horticultural University to increase the productivity, sustaining the productivity and commercialization of Horticulture in the State. Started functioning with effect from 26th June, 2007, the university was managed by the Agricultural Production Commissioner and Principal Secretary to Government, ATM as the Special Officer supported by an Officer on Special Duty from the Acharya NG Ranga Agricultural University. Three new Colleges of Horticulture, one each at Venkataramannagudem in West Godavari District, Mojerla in Mahaboobnagar District and Anantharajupeta in Kadapa District were started in the 2007-08 academic year. The UG and PG educational programmes being offered at Rajendranagar, Hyderabad under Acharya NG Ranga Agricultural University were also brought into the fold of Andhra Pradesh Horticultural University from 2007-08 academic year onwards.

The Board of Management of the university was constituted on 16th February, 2008 and the first Vice-Chancellor appointed on 26.02.2008. Consequently 28 Research Stations dealing with Horticultural Research were also brought into administrative fold of APHU with effect from 01.04.2008. The Andhra Pradesh Horticultural University started functioning independently from 10.05.2008 onwards as its headquarters at Venkataramannagudem. The University runs on the Land Grant pattern followed in the USA, with emphasis on Education, Research and Extension of Horticulture.

This university offers B.Sc. (Hons.) Horticulture, M.Sc. (Horticulture) and Ph.D (Horticulture). The course curriculum prescribed by the IV Deans' committee of Indian Council of Agricultural Research is being followed for the degree programme. Students besides course work, they shall also undergo Rural Horticultural Work Experience Programme (RHWEP) and 'Hands on Training / Experimental learning of 14 weeks each on specialized subjects, namely, (1) protected cultivation of high value crops (2) post-harvest technology and value addition (3) nursery production and management (4) floriculture and landscape gardening, dealing with commercialization of horticulture in addition to rural training for the award of Bachelor's degree. In RHWEP the final year students are deputed to stay in villages along with farmers for full one year, where they will interact with farmers of the village, work with them, understand their problem, apply the latest knowledge, acquire necessary skills and gain self confidence. These rural based training programmes i.e., RHWEP, Hands on Training/ Experimental Learning will be useful to develop the manpower requirement with a different technical expertise in view of the globalization of Horticultural trade and for imparting quality education and training in horticulture to the students to develop into well trained personnel, a part of rural development programme.

With an intention to provide self employment to rural youth, and also to make use the services of rural youth in rural development, the University has established five Horticultural Polytechnics in rural areas to offer two year Diploma in Horticulture.

Ongoing research programmes at 28 Research Stations have been reoriented into eight thrust areas identified based on the present day need. Nineteen All India Coordinated Research projects are also operating at different research stations of the university. Funds for research are provided by the State Government and also the Indian Council of Agricultural Research (ICAR). The ICAR provides 75 per cent of funds for conducting research under various All India Coordinated Research Projects of ICAR.

The University scientists are involved in popularizing the proven technologies and improved varieties developed through various extension activities, namely; All India Radio, print and visual media, participation in exhibitions, Krishi Melas, Rythu Chaitanya Yatra, Raithu Sadassulu and Adarsha Rythu Training Programmes.

4.2. Institutional Growth

4.2.1. University Campus

The A.P. Horticultural University Campus is situated at Venkataramannagudem, West Godavari district at an altitude of 34M MSL and 16^0 63'120" N Longitude and 81^o 27'568" E Longitude and located at about 12KM from Tadepalligudem on the Tadepalligudem- Nallajerla Road in an area of 216 ac. which is allotted from the erstwhile seed production farm of Acharya N.G.Ranga Agricultural University. The basic infrastructure at the time of its establishment in the year 2007 consisted of 4 Horticultural Colleges, 5 Horticultural Polytechnics and 28 Research Stations. These units comprising the basic research infrastructure are spread out in all the 7 Agroclimatic zones of the state, encompassing all the 23 districts (administrative units of the state).

4.2.2. Academic Institutions

Under-graduate courses for B.Sc. (Hons.) Horticulture

Four colleges are offering this course. Every year 272 students are admitted. Currently 766 students are pursing the graduate course. The basic infrastructure at the time of establishment of the A.P. Horticultural University during 2007 consisted of the existing (1) College of Horticulture, Rajendranagar. Later three more horticultural colleges viz; (2) College of Horticulture, Venkataramannagudem, West Godavari District, (3) College of Horticulture, Anantharajupet, Kadapa District and (4) College of Horticulture, Mojerla, Mahaboobnagar District were started.

Post-graduate for M.Sc. (Horticulture)

Post-graduate programme is being offered at two colleges of Horticulture viz., (1) College of Horticulture, Venkataramannagudem, West Godavari District and (2) College of Horticulture, Rajendranagar, Hyderabad. Every year, 40 students are admitted. Currently 81 students are pursing the Post-graduate course in the following specializations.

1) M.Sc. (Hort.) Fruit Science
2) M.Sc. (Hort.) Vegetable Science
3) M.Sc. (Hort.) Floriculture and Landscaping
4) M.Sc. (Hort.) Spices, Plantation, Medicinal and Aromatic Crops

Doctoral programme in Horticulture

Every year 5 students are admitted. Currently 11 students are pursuing the Ph.D. in Horticulture at College of Horticulture, Rajendranagar, Hyderabad.

Diploma in Horticulture

A two year diploma in Horticulture course is being offered at five horticultural polytechnics viz., Horticulture Polytechnic, Ramachandrapuram (East Godavari District), Horticulture Polytechnic, Dasnapur, (Adilabad District), Horticulture Polytechnic, Ramagirikhilla (Karimnagar District), Horticulture Polytechnic, Madakasira (Ananthapuram District), and Horticulture Polytechnic, Kalikiri (Chittoor District). Every year 130 students are admitted. Currently 225 students are pursuing Diploma in Horticulture.

4.2.3. Research

The Horticultural university is conducting basic, applied, location/ region specific and anticipatory research for the overall development of horticultural crops at 28 Research Stations located in 9 agro-climatic regions of the state. Ongoing research has been reoriented into eight themes based on the present day need. Nineteen All India Coordinated research projects are also operating at different research stations of the University. Funds for the research are provided by the State Government and also ICAR. ICAR provides 75% of the funds for Coordinated research under various All India Coordinated Research projects.

Identified Thrust areas of research are

a. Increasing production
b. sustaining productivity under biotic and abiotic stresses
c. Improving nutritive value and food safety
d. Environmental protection
e. Increasing profitability to farmers
f. Export promotion
g. Minimization of Post harvest losses
h. Processing and value addition

Research Stations

1. Horticultural Research Station, Mallepally, Nalgonda District
2. Citrus Research Station, Petlur, Nellore District.
3. Citrus Research Station, Tirupati, Chittoor District.
4. Floriculture Research Station, Rajendranagar, Ranga Reddy District
5. Grape Research Station, Rajendranagar, Ranga Reddy District.
6. Herbal Garden Scheme, Rajendranagar, Ranga Reddy District.
7. Horticultural Research Station, Adilabad, Adilabad District.

8. Horticultural Research Station, Ambajipeta, East Godavari District.
9. Horticultural Research Station, Anantapur, Anantapur District.
10. Horticultural Research Station, Anantharajupet, Kadapa District.
11. Horticultural Research Station, Aswaraopet, Khammam District.
12. Horticultural Research Station, Bapatla, Guntur District.
13. Horticultural Research Station, Chintapalle, Vishakapatnam District.
14. Horticultural Research Station, Darsi, Prakasam District.
15. Horticultural Research Station, Lam, Guntur District.
16. Horticultural Research Station, Kovvur, West Godavari District.
17. Horticultural Research Station, Mahanandi, Kurnool District
18. Horticultural Research Station, Pandirimamidi, East Godavari District.
19. Horticultural Research Station, Peddapuram, East Godavari District
20. Horticultural Research Station, Rajendranagar, Rangareddy District.
21. Fruit Research Station, Sangareddy, Medak District.
22. Horticultural Research Station, Seetampeta, Srikakulam District.
23. Horticultural Research Station, Venkataramannagudem, West Godavari District
24. Horticultural Research Station, Vijayarai, West Godavari District.
25. JVR Horticultural Research Station, Malyal, Warangal District.
26. Mango Research Station, Nuziveed, Krishna District
27. Horticultural Research Station, Jagtial, Karimnagar District.
28. Turmeric Research Station, Kammarapally, Nizamabad District.

4.3. Human Resource

At the time of establishment of the university the sanctioned staff strength was 138 faculty positions, including scientists and extension staff and 388 technical and supporting staff. Later 16 faculty members were appointed.

Teaching Staff

	As on November 2009
Professors	19
Associate Professors	34
Assistant Professors	124

Non-teaching Staff

	As on November 2009
Executive Engineer (Civil)	1
Assistant Engineer	2
Deputy Comptroller	1
Assistant Comptroller	2
Assistant Registrar	2
Superintendents	11
Senior Assistants	11

4.4 Organizational Setup

The University is governed by Board of Management, which, at present, consists of 24 Members, and is the apex body empowered to take all policy decisions. The Vice-Chancellor of the University is the Chairman of the Board of Management.

The Board of Management has representation from the State Legislature, progressive farmers and the agri-business sector. In addition, a representative from the Indian Council of Agricultural Research, 3 Academic Council Members, secretaries to the Government, representing Panchayat Raj, Finance Departments and Director of Agriculture and also Members of the Board of Management.

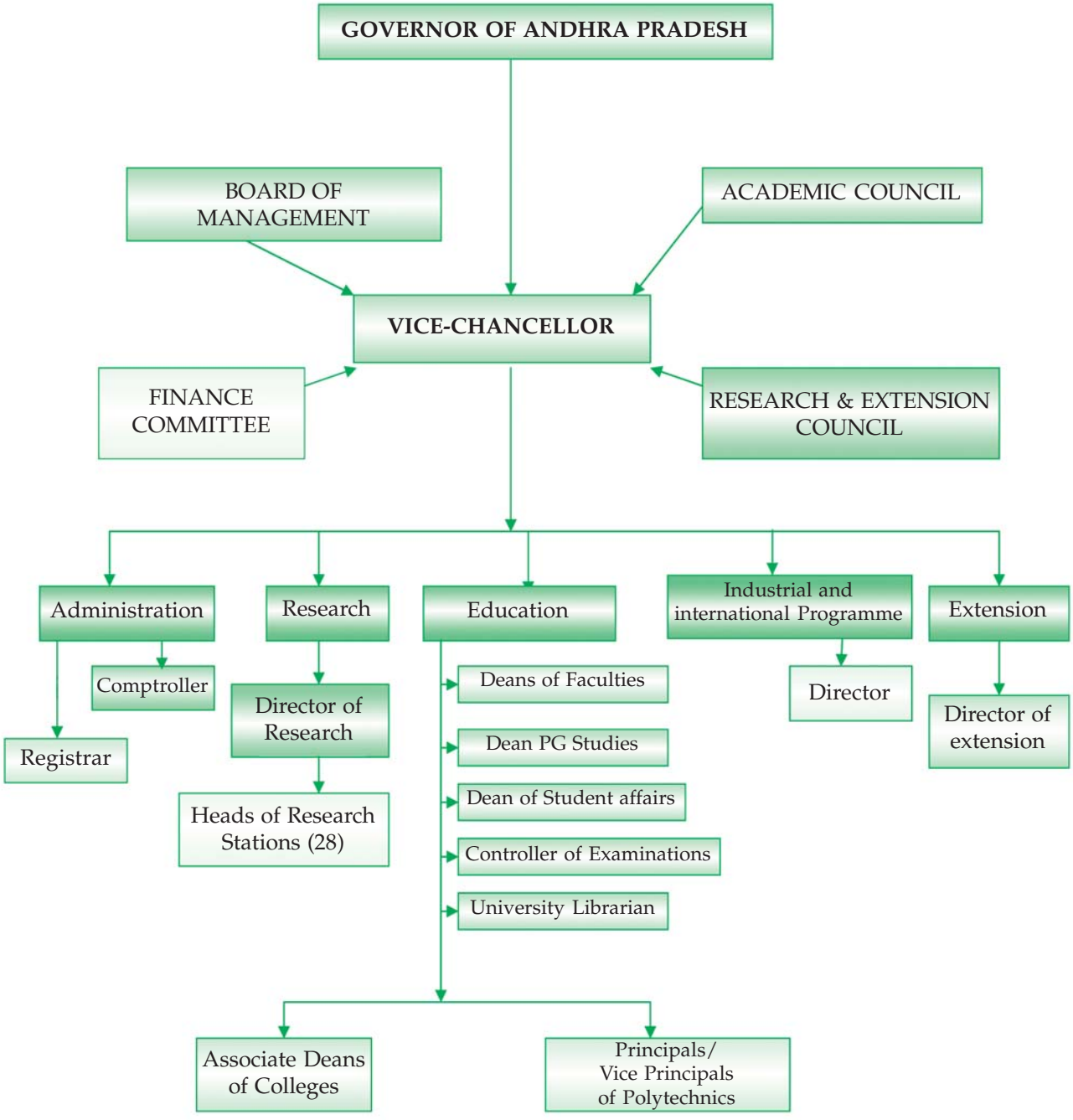
The academic administration of the University is guided by the Academic Council, which is Chaired by the Vice-Chancellor, and consists of two Members from the Board Of Management, the Deans and Directors, Principals (now Assoc. Deans) of the Colleges, the Heads of Departments of various Faculties and the Professors of the University. In addition, the Vice- Chancellor nominates four Members to the Council representing research wing of the University and prominent academicians. The Vice-Chancellor is the Principal Executive of the University and is also responsible for the academic administration.

The research and extension activities of the University are guided by the Research and Extension Advisory Council, comprising seven Members of Board of Management, Deans of Faculties, Director of Extension, Director of Research, seven Progressive Farmers representing the seven agroclimatic zones, one woman farmer and one farmer each from the animal husbandry and fisheries sectors, Directors of line Departments (Agriculture, Animal Husbandry, Fisheries, Women and Child Welfare, Horticulture), Managing Director of State Seeds Development Corporation, two eminent Scientists and two representatives of agribusiness sector, all Assoc. Directors of Research, Assoc. Deans, Senior Scientists (now Principal Scientists) and University Heads of all Faculties with Vice-Chancellor as Chairman and Director of Research as the Secretary.

The University is organized, functionally, into three operational wings, namely Education (teaching); Research and Extension and Administration and Finance. The Vice-Chancellor heads the University administration and is assisted by the Registrar who is responsible for general administration, Director of Research, Director of Industrial and International programmes, Director of Extension, Deans of Faculties, Comptroller, University Librarian and the Estate Officer. The Deans of various Faculties are responsible for implementing the academic programmes in the faculties concerned and the Directors of Research and Extension for the research and extension activities respectively, while the management of University finances is the responsibility of the Comptroller.

The Associate Deans are the academic and administrative heads of colleges, while the Associate Directors of Research are responsible for planning and implementation of the research and extension programmes and development activities in their respective agro-climatic zones as heads of the zones. The individual Research Stations, within a particular agro-climatic zone, are headed by the Heads of research Stations and the Krishi Vigyan Kendras are headed by Chief Training Organizers. The organization pattern of the university is depicted.

ORGANIZATIONAL SETUP



4.5 Finances

The University is supported largely by the Government of Andhra Pradesh, which provides funds for conducting research, teaching and extension activities under non-plan block grant budgetary provisions and also for specific schemes sanctioned under the State plan. The non-plan funds are meant to meet the expenditure of the University in respect of research stations, schemes and the colleges transferred by ANGRAU.

The University also gets financial support from ICAR, Government of India and several other National and International Agencies and agro-industries. Financial assistance is provided annually by the ICAR, as development grants for educational institutions and also for implementing a number of All India Co-ordinated projects (75% share).

Some of the extension activities of University are financed by the Government of India. Such finances are provided mainly for maintenance and strengthening of Extension Education Institute, and its training programmes, and also for some specific extension projects. The University has implemented several Ad-hoc Research Schemes financed by the State, National and International Agencies like the Indian Council of Agricultural Research, Department of Agriculture, Indian Council of Medical Research, Departments of Bio Technology, Department of Science & Technology, NIPPCD, Ford Foundation, Food and Agriculture Organization, United Nations Development Programme, IDRC, USWA etc.

APHU is selected for assistance to improve and strengthen the teaching and training capabilities of undergraduate degree programmes.

Profile of the University Budget

(Rs. in lakhs)

Year	Non-Plan	State plan	ICAR	GOI	Externally aided projects	Other agencies	Other accounts	Total
XI Plan								
2007-08	—	—	—	—	—	—	—	—
2008-09	825.59	1161.54	699.55	47.86	34.97	53.50	—	2823.01
2009-10	543.42	1548.76	893.96	48.62	14.00	646.00	—	3694.76

4.6 Administrative and Financial Reforms

The Deans, Directors, Associate Deans (Principals), and Heads of Research Stations and schemes are empowered with specific administrative and financial powers with a view to decentralize the administration for improved efficiency and promptness in administration.

5. SALIENT ACHIEVEMENTS

5.1 EDUCATION

In APHU during the academic year 2007-08, 2008-09 and 2009-10 a total students of 241, 251 and 144 respectively including nominees of ICAR were admitted into B.Sc. (Hons.) Horticulture in four Colleges of Horticulture. During the academic year 2008-09 and 2009-10 a total students of 32 and 49 respectively in M.Sc. (Horticulture) including nominees of ICAR and a total students of 6 and 5 respectively in Ph.D. (Horticulture) were admitted and 93 and 133 students respectively in Diploma in Horticulture in five Horticultural Polytechnics.

2007-08 admitted M.Sc. (Horticulture) and Diploma in Horticulture students in Andhra Pradesh Horticultural University has completed their course programme and awarded with provisional certificates.

P.G. Regulations, U.G. Regulations, Information bulletins for M.Sc. (Horticulture), B.Sc. (Hons.) Horticulture, Diploma in Horticulture and Course Catalogue for B.Sc. (Hons.) Horticulture prepared and distributed to the staff and students of APHU.

Research infrastructure for protected cultivation and post harvest management of fruits and vegetables have been created for providing Hands on training to the B.Sc. (Hons.) Horticulture students.

5.1.1 Intake of students per academic year*

a) U.G. and P.G. courses

	College & Location	B.Sc. (Hons.) Horticulture	M.Sc. Horticulture	Ph.D Horticulture
1.	College of Horticulture, Anantharajupet	55	-	-
2.	College of Horticulture, Mojerla	49	-	-
3.	College of Horticulture, Rajendranagar	75	14	5
4.	College of Horticulture, Venkataramannagudem	106	26	-
	Total	**285**	**40**	**5**

b) Horticultural Polytechnics

	College & Location	Intake of students
1.	Horticultural Polytechnic, Adilabad	25
2.	Horticultural Polytechnic, Madakasira	25
3.	Horticultural Polytechnic, Kalikiri	25
4.	Horticultural Polytechnic, Ramagirikhilla	25
5.	Horticultural Polytechnic, Ramachandrapuram	30
	Total	**130**

* Intake of students will be doubled after five years i.e., 2015 onwards.

5.2 Research

The horticultural university although a new university, the research component is very strong with its constituent horticultural research stations transferred which is very well depicted by the following outstanding research results

5.2.1. Crop Improvement

Varieties released	Year of release and level of release
Mango	Manjeera, KMH-1, Neeleshan, Neeluddin, Neelgoa, Swarna Jehangir, AU Rumani
Acid lime	Balaji, Petlur-1, Petlur-2
Banana	Kovvur Bontha (cooking type)
Guava	Safed Jam, Kohir Safeda
Elephant foot yam	Gajendra
Colacasia	Satamukhi, Bhavapuri
Sweet potato	Samrat, Kiran, RNSP-1
Coconut	Godavari Ganga, Double Century, Gouthami Ganga, Kera Bastar, Kalpa Pratibha
Cashew	BPP -1, BPP-2, BPP -3, BPP -4,
	BPP -5, BPP -6, BPP -8, BPP -9
Brinjal	Bhagyamati, Gulabi, Shyamala
Bhendi	Janardhan
Ash gourd	Shakti
Snake gourd	Swetha
Dolichos bean	RND -1
Cooking melon	RNSM – 1, RNSM – 2, RNSM – 3
Amaranthus	RNA – 1
Pumpkin	APR – 1
Tomato	RNTH – 1
Chillies	G1, G2, G3, G4 (Bhagyalakshmi), G5 (Andhra Jyothi), CA–960 (Sindhur), LCA-200(Kiran),LCA-1068 (Aparna). LCA–235 (Bhaskar), LCA-206 (Prakash), LCA-305 (Lam 305) LCA-334 (Lam 334)

Coriander	Sindhu, Sadhana, Swathi, Sudha
Fennel	Lam Selection-1, Lam Selection-2
Fenugreek	Lam Selection 1
Ajowan	Lam Selection 1
Turmeric	KTS-3 (CV 21A)
Coconut	Godavari Ganga – one of the first early released hybrid varieties with National significance
Amorphophallus	Gajendra

The University released 65 improved varieties of different horticultural crops which are popular among the farmers

Elite Horticultural crop varieties released by Andhra Pradesh Horticultural University

Variety / Hybrid	Year of Release	Yield q/ha	Specific Attributes
Coconut Godavari Ganga	1991	80 nuts/palm	High % copra and oil content. Suitable for both heavy and light soils. Comes to bearing in 36 months.
Colocasia Sathamukhi	1980	200 to 205	Good cooking quality, popular now also
Amorphophallus Gajendra	1991	410 to 420	Suitable as intercrop in banana and coconut plantation. Very much in demand even in other states.
Banana Kovvuru Bontha (Yenugu Bontha)	1995	360	Tolerant to bunchy top, sigatoka leaf spot and panama wilt.

5.2.2. Agro Techniques Developed.

- Mango cultivar Manjeera suggested for high density planting.
- Detached scion techniques were standardized for rapid multiplication of mango varieties.
- Embedded pot layering technique was standardized for commercial multiplication of guava.
- In acid lime, irrigation at 50% CPE through drip is recommended.
- Vertical storing of cassava planting materials enhanced sprouting.
- In mango, technologies for regulation of flowering and tree vigour, rejuvenation of senile and over crowded orchards and off-season fruiting were developed.

- In banana, high density planting, cropping systems, drip irrigation and fertigation standardized.
- Tissue cultured banana commercialized.
- Organic cultivation of banana standardized.
- Top working and grafting with elite lines for rejuvenation of old/senile cashew trees was standardized.
- Technologies for increasing the vase life of cut flowers standardized.
- Location specific technologies for increasing the production and productivity of various horticultural crops were developed.
- Rangpur lime identified as disease resistant rootstock for commercial multiplication of sweet orange.
- Fertilizer schedules for sathgudi sweet orange standardized.
- Agro techniques for rainfed as well as irrigated chilli standardized.
- Agro techniques for production of grain spices standardized.

5.2.3 Plant Protection

- Banana dual purpose tetraploid hybrid, FHIA and Yangambi Km-5 are identified resistant to panama wilt.
- Balaji variety of acid lime is identified canker tolerant selection
- Sweet orange accessions RGPL Brazil and RGPL Texas are tolerant to dry root rot and can be profitable used as rootstocks.
- Standardized ELISA based diagnostic protocols for banana bract virus and Ganoderma disease in coconut.
- Developed IPM technologies for the management of coconut black headed caterpillar, rhinoceros beetle, red palm weevil, eriyophid mites.
- Developed IDM technologies for the management of basal stem rot, stem bleeding, bud rot, tatipaka disease.
- New protocol for isolation of DNA of citrus yellow mosaic and citrus greening bacterium developed.
- DAC–Elisa, DAS-Elisa and Dot blot Elisa techniques are developed for large scale indexing of bud wood.
- Plant protection measures for the management of citrus diseases like bacterial canker of acid lime, leaf minor citrus and pre harvest stem end rot are standardized.
- Plant protection measures for the management of pests and diseases chilli standardized.

5.2.4. Post Harvest Technology

- Standardized a simple technique for preparation of coconut chips.
- Technology developed for bioconversion of tender coconut waste and coconut coir pith in to high quality organic manure.
- Polyhouse solar dryer was developed in collaboration with ITC for drying ripe chilli pods.

5.2.5. Pesticide Residues

The research work carried out at the Pesticide Residue Laboratory of the University has been successful in creating awareness among the pesticide users and consumers of food articles regarding the hazards associated with indiscriminate and excessive use of pesticides. Recently collected data indicated the presence of high concentrates of pesticide residues in fruits, vegetables etc.

Pesticide residues detected in various food, fodder and feed items

Pesticide	Items of food having residues of toxic levels
HCH	Tomato, carrot, cucumber, onion, radish, brinjal, bhendi, bitter gourd, greenchillies, dry chillies, chillies powder
Monocrotophos	Tomato, onion

5.2.6 Seeds and Planting Material Supply

The university also supplies planting material mainly buddings, grafts and layers of the horticultural crops to the Department of Horticulture, farmers, nursery men etc.,

5.3 Extension

The extension services of the University are mainly focused on first-line extension activities like testing and verification of new technologies on the farmers fields-through University's on-farm and adaptive trials, processing and publication of technical information, dissemination of scientific information through publications, mass media such as press, radio and T.V. channels for the benefit of farming community and extension personnel. In addition, organizing Kisan Melas, exhibitions, training of extension personnel of the State Developmental Departments.

Andhra Pradesh Horticultural University has conducted World Coconut Day and Golden Jubilee Celebrations at Horticultural Research Station, Ambajipeta from 2.9.2008 to 7.9.2008. Guava Day was organized at Fruit Research Station, Sangareddy on 17.12.2008. Seminar on Sweet Orange was conducted at HRS, Mallepally, Nalgonda Dist on 18.02.2009. Delegates of M/s. Dole Food Company, USA visited the Andhra Pradesh Horticultural University on 13.05.2009.

5.4. Distance Education

The University has started the telecast of Distance Education Programme in horticulture. This is a pioneering efforts of its kind in the country to be undertaken by horticultural University. More than

150 programmes have already been televised. A large number of scientists and teachers of the University are involved in developing appropriate and relevant modules in areas such as crop husbandry, INM, IPM, , quality seeds production, vermicompost, bio-materials production, value addition, post-harvest technologies etc. for telecast.

5.5. Publications

Even though the university has started recently the following important documents relating to University which are essential were published:

1. APHU statutes
2. APHU at a Glance (English)
3. APHU at a Glance (Telugu)
4. UG Regulations
5. PG Regulations
6. B.Sc. (Hons.) Horticulture – Course catalogue
7. B.Sc. (Hons) Horticulture students information Bulletin
8. Horticultural Polytechnic – Margadarsaka Sutralu (Telugu)
9. Diploma, UG & PG Prospects
10. APHU Diary – 2009 & 2010
11. APHU Telephone Directory – 2009
12. APHU Calendar – 2009 & 2010
13. APHU NEWS

6. IMPACT ASSESSMENT

6.1 Education

Man-power and Technology developed through education and research has to be with the present day needs; both qualitatively and quantitatively. These demands influenced by the developments in nutritional safety, food safety, environmental safety, commercialization and globalization of Horticulture and huge post harvest losses; has to be man power and technology development.

The University trains graduates, post graduates and doctorates in Horticulture who can meet the human resource needs in teaching, research, extension and developmental activities of Government Departments, Quasi-Government organizations, Non-Governmental Organizations (NGOs), input agencies, banks and other business houses. Impressed by the performance of the graduates, some private organizations are holding campus interviews to select the graduates. At present the availability is more than the demand for B.Sc. (Hons) Horticulture and employers have choice to select the best.

The diploma holders coming out of the Horticultural Polytechnics are in good demand for employment by private firms and all of them are getting profitably employed as soon as they complete their studies.

6.2 Research

6.2.1. Impact of Improved Crop Varieties

The improved Horticultural crop varieties and technologies developed in the Horticultural Research stations have contributed substantially towards increasing the production and productivity towards the economic development of the farmers and the State. They are very popular in Andhra Pradesh and some are popular in other states as well. Coverage of different crop the improved varieties in Andhra Pradesh and other states has been constantly increasing over the years.

6.2.2. Impact on Productivity and Production

As a result of the research efforts of the scientists, Andhra Pradesh occupies the first four ranks, both in production and productivity of major crops in the country as is evident from the data presented below. Considering the coverage of varieties developed by the University and their yield advantage over the traditionally cultivated varieties other conditions and treatments being the same, the estimated direct monetary benefit, apart from several indirect benefits accreting the farmers of A.P. State alone.

6.3 Extension

The major emphasis of the University extension programmes is on front line extension activities like testing and introduction of new technologies on farmers' fields, processing of technical information, technology transfer in the areas of Horticulture and farm mechanization and post harvest technology, training of extension personnel of the state and other development departments of the state Government, NGOs and others, establishment enduring linkages between research and extension activities and development of innovative extension methodologies and strategies. These activities will be implemented through the to be established District Horticultural Advisory and Transfer of Technology Centres (DHATTCs), Krishi Vigyan Kendras, Horticultural Information and Communication Centre, Extension Education Institute, Regional Biogas Training and Development Centre, Kisan Melas, Karshaka Vignana Vedikas, Agricultural Market Committee Level Trainings, Distance Education and Village Adoption. As a result of disseminating research information to farmers through Transfer of Technology by the University and as well by the line departments of the State Government, the impact of Horticulture, Research has been quite perceptible in the State.

7. SCENARIO AND SWOT ANALYSIS

With food security attained, achieving nutritional security by providing nutritious and balanced diet has been on the national agenda. The availability of 185g and 85 g against a recommended allowance of 280g and 120g of vegetables and fruits respectively per capita per day is far below the desired levels has been a bothering factor. The reasons can be many, of which low productivity levels of fruits and vegetables, huge post harvest losses and high market price.

The recommended dietary allowance as per ICMR is 120g fruits and 180g vegetables per person per day. The present production of fruits is 44 to 45 million tones as against the demand of 75-76 million tones creating an additional demand of 31-32 million tones of fruits. In vegetables cultivation, Andhra Pradesh ranks in 9th position in India, while in production of tomato and brinjal Andhra Pradesh is in 2nd and 4th position respectively. The present production of vegetables is 42.1 lakh tonnes.

7.1. National Production Scenario

Compared to developed nations the productivity of fruits and vegetables (except grapes and potato) in India is low. The overall productivity of fruits is around 10 to 11 tones per ha. The average yield of citrus is 8 to 10 t/ha as against 17 to 30 t/ha in Spain, Italy and Japan, in pineapple it is about 15-20 t/ha as against 60-70 t/ha in Philippines and Hawaii. The average yield of onion, tomato and cauliflower are 7.5, 15.0 and 7.33 t/ha respectively as against the world averages of 12.27, 20.79 and 12.29 t/ha Losses in terms of quality and quantity of horticultural produce is a major concern. As per FAO these losses maybe as high as 50% in developing countries. India is no exception to this as 20 to 40% of horticultural produces are spoiled every year because of lack of post harvest technology and management causing a loss of Rs. 3,000 crosses every year. Added to this, the country has to equip itself to face the challenges of post WTO issues as India is signatory to this. Considering these facts, prioritization of research and strategies for development of horticulture have to be done by identifying thrust areas.

To meet the domestic needs and export potential, on an average at the national level, the country should attain a per hectare yield of 20.99 tonnes for vegetables and 23.18 tonnes for fruits by the year 2025. The growth target for productivity needs to be fixed at about 3.5 per cent for vegetables and fruits. This calls for a serious effort on the part of Horticultural scientists and extension agencies to improve production. More than half of the required growth in yields must be met from research efforts by developing appropriate technologies

Growth in yield of Horticulture

Food	Yield (t/ha)		CAGR (%)
	2000-01	2025	
Roots & tubers (dry equivalent)	4.24	5.40	0.97
Vegetables	11.08	20.99	2.59
Fruits	12.52	23.18	2.49

The diversification is already in vogue as evident from increasing rates of growth of production of horticultural crops. India has already emerged as the second largest producer of fruits and vegetables, and given the current trends of growth, it is expected that in the near future the country will emerge as the largest producer of horticultural commodities: the country already ranks first in production of cauliflower, second in onion and third in production of cabbage. Increased production of fruits has already pushed up the export of fresh fruits from Rs 188.75 crores in 1994-95 to Rs 811.42 crores by 2004-05. That of fresh vegetables has increased from Rs 79.14 crores in 1994-95 to Rs 813.63 crores in 2004-05. Rapid growth in the export of floricultural products, i.e., cut flowers, cut foliage plants, seeds and tubers and corms of various flowers, was observed resulting in an increase from Rs 30.84 crores in 1994-95 to Rs 205.25 crores in 2004-05.

7.2. Natural Resources

Land, water, biodiversity and climate are the fundamental resources for horticultural development. The country is richly endowed with these resources and the variability of agro-ecological settings confers the advantage of supporting multitudes of crops and other vegetation and production of almost all crops within the country. Unfortunately, the resources are rapidly declining under various biotic and abiotic stresses. The loss of agro-biodiversity in the form of land races of all those crops which have particularly been improved by genetic manipulations in the last three decades is rather alarming. The list of endangered species is growing.

It is estimated that about 170 million hectares of land area suffers from wind and water erosion, and about 10 million hectares are affected by salinity; 7 million hectares are under water logging and 3.5 million hectares constitute ravines. Due to intensive cropping and imbalanced fertilizer use, nutrient deficiencies are becoming common.

Sustainable management of resources is of great significance, especially under rainfed horticulture, which accounts for about 57 percent of the total cultivated area in the country. Even if the total irrigation potential in the country is fully realized, about 50 per cent of the cultivable area will continue to be rainfed. General productivity in the rainfed areas is not only low but the overall production varies considerably from year to year due to associated vagaries of weather.

7.3. Water use efficiency

India has one of the largest irrigation systems in the world, over a land area of 48 million hectares, effective utilization of irrigation facilities and efficient water use are essential for ensuring optimum utilization of water which is a critical input in horticulture. Therefore, systems that enhance the efficiency of water use need to be developed. Watershed management, rainwater harvesting, and groundwater recharge can help augment water availability in rainfed areas. Micro irrigation is also important to improve water use efficiently.

7.4. SWOT analysis for the state and university

7.4.1. Strengths

7.4.1.1. Andhra Pradesh

Like any other State, Andhra Pradesh has both strengths and weaknesses, opportunities as well as threats which often influence the growth and prosperity of the State and the people. These, for the State and the University are highlighted below.

- Stands among the top five Indian States in terms of cultivable land.
- Strategically located in south-central part of India with easy access to all parts of the country.
- Climate is fairly congenial for a variety of horticultural crops and horticultural allied activities
- Rich natural resources
- Second largest coastline in the country providing several gate ways for international trade.
- Served by several perennial rivers like Krishna, Godavari, Tungabhadra, Vamsadhara
- Diverse soil types which facilitate cultivation of large number of crops round the year
- Enterprising, receptive and hard working farmers
- Location of several National Institutes and an International Institute and other organizations working on horticultural R & D relevant to the state.
- Large extension network system.

7.4.1.2. Andhra Pradesh Horticultural University

Since the University is influenced stage with as two years as effective and the goals are mountainous, it is too early to assess the situation on SWOT analysis but yet with an existing situation the following SWOT analysis is made.

- The setting of the University in a pollution free environment representing the green belt where the receptivity, inquisitiveness and entrepreneurship is very high.
- The University has established a good rapport with the local , district level, state level , national and international level institutes dealing with education, research and extension activities. Their strength, Cooperation, collaboration and support can be secured for development of this university.
- With new research and extension responsibility , this university has greater scope to initiate and coordinate research projects with state agriculture/ Horticulture department, basic science universities/ institutes of ICAR and secure greater integration for effective technology generation and dissemination
- Each college and research stations have got and also carrying up with some highly specialized, well developed and equip departments and also has experience of serving as a centre of advanced studies/research laboratories
- Our major strength possessing of highly qualified and experienced teachers/ scientists, well equipped research centres and laboratories for basic and applied research.
- The courses and curriculum of the undergraduate and post graduate programs in different qualities and Dynamic approval of needful revision as and when required provides a solid background for all-round development of the students.
- The university in addition to pollution free centralized and research centres as land for seed production which is a great asset to earn a name in the service of the farmers.

7.4.2. Weaknesses

7.4.2.1. Andhra Pradesh

- Allocation of grants from different sources becoming delayed which hamper the progress
- Lack of resources and personnel for diagnostic surveys has been one of the drawbacks in research and extension effectively.
- Despite development of production technologies, their impact is vitiated due to frequent and uncontrollable natural disasters. We do not have priority and program on disaster management.
- Long coast line often subjected to cyclones and storms
- About 60% of gross cropped area is under rainfed farming
- Fragmented and small farm holdings.

7.4.2.2. Andhra Pradesh Horticultural University

- Because the University is budding stage, lack of man power is a main constraint
- We have not made desired progress in basic and strategic research which is essential for the advancement of science
- There is also lack of appropriate priority setting at the university level which leads to duplicity of research and infrastructure development
- The University is poised for development of horticulture and related industry in conformity with the norms and standards set by WTO which is only possible if we have a required number of scientists. Unfortunately there number is low.
- The institutional linkages to strengthen human resources development, collaborative research , staff training and management issues is not sufficient to meet new challenges for the next 20-25 years.
- There is lack of sufficient funds for renovation and modernization of laboratories which were established.
- The new technologies developed/evolved were mostly aimed at quantity but not the quality and nutritional aspects. Sustainability aspect in production is not addressed much.
- Dryland horticulture production especially for the small and marginal farmers has not made any headway.
- The university does not have well equipped laboratories and infrastructure at interior research stations which are essential for conducting location specific research.

7.4.3. Opportunities

7.4.3.1. Andhra Pradesh

- With the globalization of the markets there are ample opportunities for high demand of new products, similarly there is a glowing demand of highly trained manpower in the specialized subjects.
- India being the member of WTO and globalization of agriculture, the university scientists will now have many challenging areas of new research projects.

7.4.3.2. Andhra Pradesh Horticultural University

- The waste lands can well be utilized by horticultural crops which provide an opportunity to scientists to work in an integrated manner and raise production and employment opportunities.
- The cropping intensity, crop diversity in irrigated and rainfed areas is very low which can be doubled using the advanced technologies in irrigation, protected cultivation etc.
- Due to globalization, new areas have emerged for production , processing and service sector. The progress and\ growth demands for future research in these areas
- The diversification towards horticulture will prove ample opportunities to the scientists, farmers and industries to move towards prosperity and self employment in the agriculture sector.
- New areas in every allied disciplines to Horticulture will be emerging to be tackled through long-term research i.e; soil and water management, biotechnology, energy management, marketing, processing etc which requires continuous research.
- The different research stations located in different agro-climatic regions and different horticultural crops can result in tangible results and the genetic diversity in horticulture.
- Scope for e-communications and e-extension of research findings.

7.4.4. Threats

7.4.4.1. Andhra Pradesh

- There is already growing awareness about the hazards the Indian Horticulture is likely to face in the next century on account of stagnation in the yield, unabated growing pollution, continuous use of chemicals and pesticides with harmful residues, depleting resources and many other adversities.
- Due to over increase in population, growing urbanization, pollution of air, soil and water and excessive industrial effluents Horticultural production may adversely affected.
- With the dominance of industrial sectors and a handful of influential, there is a continuous Threat to harvest crops with effluence and pollutants which will provide hazards to crops, trees, human and animal health.

7.4.4.2. Andhra Pradesh Horticultural University

- The development of different areas like hills, forests etc required dedication contrary to the existing environment and lifestyle of the scientists and staff where every one wants to move towards urban/city areas in the plain as a result, the work suffers in different ways.
- The commercialization of horticulture is a problem areas need huge investment and capital beyond the reach of the farmers .
- Erratic distribution of rainfall, Droughts, floods and cyclones of high frequency and intensity, Irrigation and drinking water scarcity, Limited availability of land for agriculture, Threat of extremism, absentee land lords leading to ineffective utilization of land and other resources.

8. PERSPECTIVE PLAN

8.1. Present scenario of horticultural university

The Andhra Pradesh Horticultural University (APHU) second of its kind in the country was established on 26th June, 2007 at Venkataramannagudem, West Godavari District, Andhra Pradesh carrying out from A.N.G.R. Agricultural University (ANGRAU) Hyderabad for the benefit of all the stake holders dealing with horticulture and allied sectors like processing industries, landscape designing etc., in the state of Andhra Pradesh.

The APHU at present has 4 Horticultural Colleges, 5 Polytechnics and 28 Research Stations located in 9 agro-climatic zones of the state. The university offers B.Sc. (Hons.) Horticulture, M.Sc. (Horticulture) and Ph.D. Horticulture, besides two year diploma in Horticulture. The course curriculum prescribed by the IV Dean's committee of Indian Council of Agricultural Research is being followed for the degree programme. This university is conducting basic, applied, location/ region specific and anticipatory research for the overall development of horticultural research in the state. The research programmes are covered under 3 categories namely, Non-plan projects / University projects, ICAR plan projects under All India Coordinated Research Projects. Nineteen All India Coordinated Research Projects (AICRP) on different crops viz., Mango, guava, grape, banana, citrus, sapota, jack, cashew, coconut, oilpalm, palmyrah, spices like chillies, turmeric, black pepper, tuber crops, vegetables and flower crops, are being operated at different centres. Projects sponsored by Department of Biotechnology (DBT), CDB, National Horticulture Mission and State Horticulture Mission funded projects are also being operated at different research stations of Andhra Pradesh Horticultural University.

8.2. Perspective

The horticulture scenario in the country, particularly in Andhra Pradesh, is rapidly changing. To achieve the objective of developing the horticultural growth engine, it is imperative to focus attention on train manpower through imparting education, post graduate programmes in specialized horticulture advanced training in research methodologies and instrumentation, high-tech horticulture, bio-technology micro irrigation, fertigation, IPM, INM, bio-fertilizers, bio pesticides, pesticide residue, PHT and product development. APHU would conduct research with major thrust areas of increasing productivity, sustaining productivity under biotic and abiotic stress, improving nutritive value and food safety, environment protection, increasing profitability to the farmers, export promotion, minimization of post harvest losses, processing and value addition. Intensification of research work in horticulture biotechnology, periurban horticulture, protected cultivation, post harvest technology, dry land horticulture, mechanization in horticulture, organic horticulture, bio-control of strengthening of information technology in horticulture and related issues of utilization of information technology in horticulture towards increasing productivity and intensification of extension activities.

9. ISSUES AND STRATEGIES

The university since last year is making all round progress in the spheres of human resource development through imparting quality education, research and transfer of technology. The human resource development through undergraduate and post graduate programmes has been the prime focus of the university as a result of which university has four colleges of Horticulture with twelve departments and specialized courses in post-graduate programmes.

9.1. Strengthening of education system

In view of the changing national and global horticultural scenario due to advances in technology, requirements of enhancing and sustaining the horticultural production for food and nutritional security with the perceptible change in food habits, globalization and environment degradation etc., the priorities for human resource development held to be altered so that the pass out graduates become globally competitive and acceptable.

Priorities and thrust areas

The major issues to be tackled to achieve the above goals would be

- Strengthening UG Programmes
- To train human resources in core and emerging areas by introducing new UG Programmes.
- Improving the faculty competence
- Modern examination system and e-learning and e-teaching
- Development of experimental units for hands-on training
- Provision of visiting faculty in specialized areas
- Specializations in PG programmes
- Inter Institutional faculty and students exchange
- E-advise system
- Development of Institutional linkages at National and International levels.

Strategies

The means, approaches and strategies to achieve the objectives of the thrust areas would be through a well planned multidisciplinary approach. Accordingly the education in research has to be planned by integrating advanced technologies.

▲ Improving the faculty competence:

As the U.G. and P.G. syllabi are periodically modernized, it is essential that the faculty members shall be updated in their knowledge. This can be achieved by sending the faculty members for higher training in recent specialization viz., Biotechnology, Molecular biology, post harvest technology and green house technology, DNA finger printing, transgenics etc., at reputed National or International institutes.

▲ Modern examination system and e-learning; e-teaching etc.

It is time to modernize our examination systems at university levels by modernizing using the modern software techniques introducing on-line final semester examinations. For this necessary systems have to be developed using software techniques. In developed countries this has been already introduced for e-learning and e-teaching. The system also provides an access to teachers who are abroad or physically far off from on place to other.

▲ Development of experimental units for hands-on training

Hands-on-training programmes are useful to impart practical training to the U.G. students in Horticultural Universities in specialized areas of choice by the final year students. This helps creating confidence and practical approaches by the student in application his theoretical knowledge into practice and utilization. This programme requires financial assistance by the council to AUs for development of facilities.

▲ Provision of visiting faculty in specialized areas:

Rapid developments are envisaged in the Science & Technology due to globalization and this needs updating the faculty in modern areas of specialization in the subject matters viz., Molecular biology, biotechnology, Post harvest technology, production of transgenic plants etc., for accomplishing this, professors / experts from other countries or national institutes may be invited as visiting professors to train our faculties in specialized areas.

▲ Specializations in PG programmes

Specializations under post graduate programme includes M.Sc. (Horticulture) and Ph.D. (Hort.) in

1. Fruit Science.
2. Vegetable Science.
3. Floriculture and Landscaping.
4. Spices and Plantation Crops.
5. Post-harvest Technology.
6. Entomology.
7. Plant Pathology.
8. Genetics and Plant Breeding.
9. Agronomy and Soil Science.
10. Physiology, Bio-chemistry and Microbiology.
11. Extension, Economics and Social Sciences.
12. Engineering and Environmental Sciences.

▲ Inter Institutional faculty and students exchange:

Exchange of students and faculty among various National or International Institutes is a good approach to update the knowledge of the faculty and to strengthen the academic standards.

▲ e-advise system:

Establishment of "Career related information, advise and guidance centres" in universities/ colleges with ICAR coordination. Establishment of video-conference halls at all colleges of universities with linkage to ICAR and will be used for special lectures by National professors/Eminent scientists.

▲ Development of Institutional linkages at National and International levels:

The Horticultural University shall establish close linkages with National Institutes of ICAR, other National Institutes of Government of India and other traditional universities for training of the faculty in specialized areas, for refinement and exchange of views, for improvement of academic standards. Linkages may have to be developed with International Institutes and foreign universities for higher training of faculty and in turn to improve our academic standards. The professors of abroad may be invited under visiting professors scheme for improving standards of our faculty. The scientists of national institutes may be accredited in AUs for P.G. Research.

9.2. Strengthening of ongoing research areas

Burgeoning population, shrinkage of arable land due to urbanization and industrial growth, depletion of natural resources and nutritional status of soil have limited the horizontal expansion in horticultural crops. Vertical growth in terms of productivity, low pre and post harvest losses, location/ region specific high value crops, expansion through diversification, cost effective productive systems and off season production would be the best options for future development.

Priorities and thrust areas

- ▲ Increasing productivity
- ▲ Sustaining productivity under biotic and abiotic stress
- ▲ Improving nutritive value and food safety
- ▲ Environment protection
- ▲ Increasing profitability to the farmers
- ▲ Export promotion
- ▲ Minimization of post harvest losses
- ▲ Processing and value addition

Strategies

The ways, approaches and strategies to achieve the objective of the thrust areas would be through a planned research with multi disciplinary approach to develop sustainable technologies which could be easily adopted in farmers fields. Accordingly the research programme has to be reoriented by integrating multi disciplinary approach.

▲ Increasing the productivity of horticultural crops by

- ❖ Evolving high yielding varieties of fruit crops, vegetables, plantation crops, spices, ornamentals and medicinal crops.

- Evolving technologies for increasing productivity in fruit crops, vegetables, plantation crops, species, medicinal & aromatic crops.
- Ensuring adequate availability of quality planting material

▲ Sustaining productivity under biotic and abiotic stress by

- Minimization of yield losses due to insect pests and nematodes
- Minimization of yield losses due to diseases
- Minimization of yield losses due to abiotic stresses

▲ Improving nutritive value and food safety by

- Improving quality and nutritive value of horticultural crops.
- Ensuring food safety of horticultural crops

▲ Ensuring environment protection in horticultural crop production by

- Monitoring and development of packages for ensuring safe environment in horticultural crop production

▲ Increasing profitability to the farmers by

- Participatory rural approach for assessing the research needs in horticulture.
- e-extension for faster transfer of technologies.
- Reducing the cost of production and increasing profitability by enhancing the input use efficiency of water, nutrients, pesticides, labour (mechanization).

▲ Export promotion by

- Market intelligence for export promotion and import restriction
- Economics of production of horticultural crops
- Pest risk analysis for non tariff barriers for imports.

▲ Minimization of post harvest losses in horticultural produce by

- Minimization of post harvest losses through pre harvest, post harvest practices and handling and storage

▲ Processing and value addition

- Product diversification and value addition in horticultural crops by processing.

The current on-going research programmes of the university have-been re-oriented in the light of the thrust areas and priorities identified by bringing all the on-going programmes under target mode with multidisciplinary approach. The research programmes will be formulated based on the thrust areas identified with specific problems as research activities. Targets based on indicators with activity milestones assigned to scientific staff to achieve the objectives of vision. Reoriented research programmes are given with definite time frame.

9.3. Strengthening of extension activities

Education of rural youth in horticulture and allied areas would be primary function of the horticultural extension. The extension activity of the university will include.

- Technology assessment and refinement
- Training master trainees and farmers.
- Organizing *Kisan melas, Exhibitions*, *Rythu sadassulu* etc.
- Horticultural information centers for single window delivery.
- Dissemination of information through electronic media.
- Conducting on-farm research, demonstration of technologies in the farmer's fields.
- Supply of disease free quality seeds and planting materials to the farmers.
- Transfer of technology and impact assessment
- Establishment of video-conferencing facilities between Horticlubs and university experts for e-extension.

9.4. New Initiatives

9.4.1. Education

Creation of new departments in Horticulture:

In the light of the changes taking place in the global scenario of the horticulture, there is a need to create new departments in Horticulture.

1. Department of Pomology
2. Department of Olericulture
3. Department of Floriculture and Landscaping
4. Department of Post-harvest technology
5. Department of Medicinal and Aromatic plants
6. Department of Horticultural Economics and Business Management
7. Department of Horticultural Biotechnology
8. Department of Environmental Horticulture
9. Department of Forestry and Hill Horticulture
10. Department of Plant Pathology
11. Department of Entomology
12. Department of Genetics and Plant Breeding
13. Department of Agronomy and Soil Science
14. Department of Physiology
15. Department of Biochemistry
16. Department of Microbiology

17. Department of Extension
18. Department of Social Sciences
19. Department of Computers and Information Technology

Based on the emerging future need the following specialized schools (Directorates) would be formulated.

1. School of Crop Improvement
2. School of Resource Management
3. School of Crop Protection
4. School of Basic Sciences
5. School of Social Sciences
6. School of Business management
7. School of Environmental Sciences

Establishment of centres of excellence/advanced studies

During the past three and half decades of service to the state in the development of horticulture and allied fields under the stewardship of able administrators and scientists, the University has acquired good infrastructure and a position of pride and repute among the Agricultural/Horticultural Universities of the country. Though their contributions and competence some of the Units have emerged centres in their respective fields which can be further developed as centres of excellence/schools of advanced studies such as:

- Centre of Excellence for sustainable Horticulture (Precision farming)
- Centre of excellence for post-harvest management and value addition.

9.4.2. Research Programmes

Increasing production through expansion of area under horticultural crops: With rapid urbanization, expansion of horticultural crops to fertile soils would be a limiting factor in the near future. Bringing additional areas under horticultural crops is a matter of great importance. In this direction, research work would be intensified in the following aspects:

- Standardizing techniques for propagation and mass multiplication of genuine and disease free planting material
- Bringing additional areas under cultivation by expanding cultivation in marginal lands, degraded lands and problematic soils by identification of suitable rootstocks and standardization production technologies in saline lands.
- Peri-urban horticulture under protected cultivation has a great potential in breaking seasonality barrier and enhancing productivity many fold.
- Technologies for off-season production of horticultural crops.
- Protocols for the homestead gardens in urban areas and popularize the same.
- Crop diversification to develop integrated farming system for higher production.

Increasing productivity through crop manipulation: Evolving technologies to improve yields per unit area (productivity increase) would add to the total production. To this end, research on i) cropping system research, ii) high density orcharding, iii) crop modelling studies (canopy architecture, training and pruning studies) and iv) input use efficiency of nutrients, etc., are priority areas.

Monitoring of soil health and biosphere for increased productivity

Excess and indiscriminate use of pesticides and inorganic fertilizers has become detrimental to soil health and leads to pollution of the biosphere. Pollution of biosphere can be lethal to useful insects, birds and human beings while pollution in the soil can be lethal to crop husbandry, aquatic and land animals and human beings because of ground water pollution. Soil health is the most important factor in crop husbandry for sustaining productivity. In the light of this, research programmes are to be intensified at the institute in the following areas to sustain the soil health while improving productivity.

- Developing varieties/hybrids resistant to insect pests, diseases and nematodes. Work in this direction would be further intensified by integrating with biotechnological tools like marker aided selection and breeding, gene mining, gene trapping etc.
- Develop protocols for IPM, IDM using trap crops, pheromone traps plant products, botanicals, biological control agents, micro organisms etc. in order to reduce the use of chemical pesticide
- Studies on survey and surveillance of pests and diseases, pest risk analysis, prediction models on their occurrence to arrive at need based application of pesticides.
- Studies on the effects of pesticides on non-target pests and pathogens which are useful to plants and soil health.
- Substrate dynamic studies to understand the factors influencing the total productivity of crops.
- Studies on need based application of fertilizers based on leaf nutrient guides and use of radio tracer techniques.

Reducing cost of production for sustainability

The cost of inputs in horticulture including labour are increasing enormously while that of farm produce is showing a slower increase in growth. Hence, economic and efficient use of inputs besides increasing productivity contribute to reducing cost of production and make the horticultural produce cost competitive. In this direction, the research programmes with the following objectives are to be intensified:

- Evolving varieties/hybrids with multiple pest/disease resistance.
- Develop protocols for IPM, IDM and INM for various fruits, vegetables, ornamental crops to save the input cost towards pesticides.
- Develop schedules for time and spot of application of fertilizers to save the cost on excess use of nutrients.
- Efficient use of water through micro irrigation techniques and fertigation studies.
- Farm mechanization in horticultural operations to save labour input and time.

Sustaining productivity under drought / water deficit conditions

Water has become scarce due to erratic monsoons, low precipitation and excess ground water exploitation as a result of urbanization. To combat such situations research work on sustaining productivity under water deficit situations would be the preferred approach with the following objectives of enhancing input use efficiency of water.

- Breeding drought resistant varieties/hybrids.
- Identification of rootstocks tolerant / resistant to drought situations.
- Minimization of evaporation of moisture in soils through mulches and cover crops.
- Minimization of rate of transpiration by use of anti-transpirants resulting in improvement of yields and also water status.

Bringing horticultural crops under drip irrigation and work out the optimum levels of water requirement to sustain productivity levels and enhance water use efficiency.

Nutritional security

Nutritional security in the form of intake of essential nutrients in required quantities through balanced diet plays a vital role in supporting a sound physical and mental health, for building robust and a sound nation. Nutritional insecurity amongst masses is widespread in India which is evident from the increased of malnourishment, infant mortality (iodine deficiency disorders), anemia, etc., and are the biggest challenges which need to be tackled on war footing. Fruits and vegetables are the rich sources of nutrients and can provide the required nutritional security. Apart from providing calories (energy rich) it is also essential to provide safe food. To meet these challenges the research work would be intensified in horticultural crops in the following areas –

- Developing varieties/hybrids of fruits and vegetables rich in nutrients
- Identification, exploitation and domestication of native and wild minor and under utilized fruits and vegetables rich in vitamins, minerals and antioxidants.
- Develop technologies and protocols which can increase the cooking qualities in terms of nutritive value through post harvest management practices.
- Develop IPM,. IDM and INM protocols to ensure pesticide residue and toxin free horticultural produce.
- Standardization and promotion of organic horticulture to provide safe and nutritive produce.
- Identification, domestication and popularization of medicinal plants which have greater medicinal value.

These are some of the research areas, which hitherto were not attempted with serious concern. The outcome of this research in the coming years would not only play a significant role in providing safe and nutrient rich food but also gives a boost to the exports.

Breeding for high yields: In food crops like cereals and pulses the yield levels have reached a plateau and further increase in yields would be very difficult. Under these circumstances, fruits and vegetables are the crops of choice for increasing the productivity levels by exploiting their yield potentials. The productivity levels of fruit crops are targeted to be increased to 12t/ha from the current

level of 11t/ha and in vegetable crops to 16t/ha from the current level of 15t/ha during the X plan period. Research projects aiming at developing HYV/HYH by exploiting hybrid vigor and through bio-technological interventions constitute an important component of Vision 2030.

Breeding for resistance to biotic and abiotic stresses: The crop loss due to various biotic stresses such as insect pests and diseases is estimated to be 20 to 25% in horticultural crops. This loss can be reduced by developing varieties and hybrids through conventional and non-conventional (using biotechnological tools) means resistant/ tolerant to insect pests and diseases. The crop loss so prevented would result in an enormous gain and boost the food security of the nation. With ever increasing population and rapid industrialization and urbanization, erratic monsoons and over exploitation of ground water resources there is depletion in water availability to crop production. Also due to indiscriminate and excess use of irrigation water, large tracts of horticultural land are becoming saline. Under these circumstances evolving varieties/rootstocks that withstand moisture stress and salinity should receive the due attention.

Improving the quality

Today the consumers are more quality conscious round the globe. Quality is a broad term including hygiene, health, chemical composition with reference to nutrients and taste and physical appearance. In this back drop, there has to be an emphasis on the following aspects:

- Appeal and uniformity in produce through breeding or by use of biotechnological tools and crop regulation.
- Breeding varieties/hybrids with higher nutritive value.
- Minimizing pesticide residue levels through IPM, IDM practices and pesticide residue dissipation of techniques
- Exploitation of minor and under utilized fruits and vegetables rich in vitamins and minerals
- Promote organic horticulture by standardizing protocols.

Minimization of pre and post harvest losses: It is estimated that because of the high perishable nature of horticultural crops, the crop loss is estimated to be about 30%. If appropriate technologies are developed to reduce this crop loss, there would be a substantial gain which will add up to the total food bowl of the country. In this direction, research work is to be intensified in the following areas:

- Developing varieties/hybrids with higher shelf life / storage life and long distance transportations using biotechnological tools
- Standardize the handling and storage of horticultural produce
- Value addition through developing technologies for processing into value added products
- Studies to minimize the microbial degradation of horticultural produce.

Export Promotion and import restriction

To promote export, apart from becoming quality competitive, the produce must be cost competitive. In this direction, work would be taken up in the areas.

- Breeding varieties / hybrids in fruits, vegetables and ornamental crops for export standards.

- Codex alimentarius and standardize protocols for exports
- Pest risk analysis and non-tariff barriers to restrict imports
- Initiate work on market intelligence and e-commerce to facilitate exports to various destinations based on prediction of demands and export prices
- Various factors influencing the cost of exports to bring down the prices.

Work on post harvest technology for long term storage protocols for shipment of produce, processing for value added products, post harvest disease management and reduction of the microbial degradation and spoilage due to microbes.

Globalization of horticulture

In the post WTA/GATT era unless the horticultural produce is cost and quality competitive the horticultural industry cannot thrive. To make the Indian horticulture more global competitive, research is to be intensified on the following:

IPR related programmes

The post GATT era is most important with regard to IPR issues. In this direction, work on a few issues to protect our technologies from IPR threats would be necessary.

- Management of genetic resources: The bio-diversity in horticultural crops would be maintained by proper documentation. DNA finger printing of crops would be taken up. Work will be intensified in the following areas.
- Gene mining and gene trapping.
- Bio-informatics not only with regard to germplasm but also with regard to biopesticides and biofertilizers.

Reorganization of research

The University, at present has one Director of Research. He is responsible for planning, co-coordinating, controlling, monitoring, evolving, managing, administering and documenting research in their respective fields. Keeping the vast service area of this fifth largest state of the country and the importance of horticulture and allied sectors in the state's economy, and to increase the efficiency of the Directorate in discharging their functions effectively, it is proposed to establish the following directorates by the end of 2015 A.D.

Proposed Directorate	Headed by	Responsibilities relating to
1. Directorate of Resource Management	Director (Resource Management)	Soils, water, generic material, Watershed management
2. Directorate of Plant Protection	Director (Plant Protection)	Pests and diseases of all crops Including IPM
3. Directorate of Horticultural plant Nutrition	Director (Plant Nutrition)	Fertilizers, biofertilizers, manures, INM and all aspects of plant nutrition, plant physiology
4. Directorate of Commercial Horticultural	Director (Commercial Horticultural)	chillies, turmeric etc.,
5. Directorate of Industrial and International programmes	Director(IIP)	Coordination of programmes with industries in relation to the broad objective of the university and coordinate the International programmes concerning the university
6. Directorate of Cropping Systems and Farming Systems	Director (Cropping Systems & Farming Systems)	New crops, crop sequences, cropping systems, farming systems
7. Directorate of Economics and Statistics	Director (Economics & Statistics)	Hort-economics, statistics, mathematics and all other related subjects.

9.4.3 Extension

Issues and Strategies related to Extension Education and information Dissemination

With increasing advancements in research, management and information communication technologies, extension programme of the University needs to be modernized and fresh approaches initiated which would be farmers-friendly, ecologically sustainable and may encourage participatory approaches. In order to harness the full capabilities of electronic connectivity, high-tech horticulture and entrepreneurial potential of farmers, the extension system needs modernization both in philosophy, content and approach of work. Some of the salient features of the issues and strategies related to the university extension and information dissemination for 2030 are as follows:

KVKs to serve as Nerve Centre of Extension

It is hoped that by 2030 each district under area jurisdiction of the University will be covered by one or two KVKs. The KVKs will have need-based staffing pattern, especially in respect of the scientific staff on the basis of periodic review of situation and horti-ecological based vacations. Each KVK will have infrastructure facilities for production of audio-visual materials for on-campus and off-campus training. KVKs will be electronically linked with the University on one hand and the development as well as farmers' organizations on the other. This will be helpful for maximum utilization of scientific inputs duly blended with local experience and expertise. With several innovative programmes, activities and roles KVKs will emerge as nerve centre of extension in the hills linking technology assessment and refinement band its dissemination through mass media.

Emphasis on Internet-aided Extension Work

Use of computer in the Directorate of Extension and its outreach branches will enhance organizational efficiency through management of information systems and decision support system, Paperless officers will be in operation and lengthy bureaucratic delays in filing reports will be done away with. Further, immense potential of computers in providing ready to use extension services for the progressive farmers' for adopting high-tech horticulture cannot be over emphasized. Computer aided extension will be a valuable component of farm advisory services for agriculture and related subjects. Tele-text and videotext would also be available to provide information on market price, management, technologies and decision making issues.

Farming-Friendly Participatory Extension Approach

The socio-political changes in the country would demand farmer-first extension system. Farmers' participation in technology development and extension would be the main feature of the new extension approach. This will require mobilization of self-help groups in rural community to nurture farmers' initiative in their own development. Farmer to framer communication and training will be encouraged. Farmers will need training in managing local groups efficiently. Thus, University extension will become facilitator in the process. Similarly farmers' experimentation will be facilitated by advice and infrastructure support from the University and other refined systems. In order to make technology more relevant for farmers of different categories, close interaction between scientists, extension functionaries and farmers will be needed. Self-help group of farmers will be appropriate forum for implementing technology assessment and refinement and communication. Strengthening University extension system and farmers' organization with Government department rendering only regulatory, supply and service functions will minimize the farmers' dependence on the State. A lot of efforts will be needed to infuse self-management capabilities in farmers groups. Such organization will be linked together for exchange.

Commodity-based Extension

Commodity-based group formation would be facilitated for those engaged in flower cultivation, horticulture, processing and such other enterprises. Such specialized farmers' group will have capability for growing products for export and specialized market.

Thus, in order to get high technology and supporting information on marketing, processing etc., they will be connected with the University for assessing latest information and getting necessary advice

Identification, Documentation and validation of Indigenous Technology Knowledge

Keeping in view the need for maintaining bio-diversity and preservation and utilization of indigenous technological knowledge of local population, identification, documentation and verification of indigenous and farmers' generated knowledge and technologies will be done. Scientists and extension workers will need training to use sociological methods of working closely with the farmers in this venture. Such efforts will help in generating a mix of traditional technology and scientific recommendations for easy acceptance among farming community and maintenance of sustainability of natural resources.

Distance Education for Farmers

Human resource development through training and education will be the major thrust of future extension. Training and education efforts will be needed not only in the emerging areas of technologies,

entrepreneurial skills and their management but also in conflict resolution, personal growth and effectiveness, leadership networking, etc. Thus, more and more farmers can be benefited through distance education course via television, radio, broadcasting, interactive audio and video system besides print and programmed learning materials, which would be the distinguished feature of extension teaching, and learning process.

On the line of IGNOU, the University would launch and conduct in collaboration with the Doordarshan and private TV channels, distance education programmes that would have suitable direct linkage with the Pant Farmers'Club network as the base and KVKs as the middle-level for imparting skills

Provision of the Single Window Service/Advice System

At the University headquarters and KVKs, the Kisan Sewa Kendra/Horticulture Technology Information Centre (ATIC), single window system of providing service, high-tech advice and inputs shall be introduced on the lines as being done by the Medical College to outpatients. These centres will be suitably linked with the specialized labs of different colleges of the University. For advice to visiting farmers suitable interactive video system would be developed and put to use. This could be suitably linked with the outreach stations. The KVKs will also have similar ATICs for multiple role through the same unit.

Total Uplift of Farm Family

Most of the farmers in the Uttaranchal belong to the category of marginal and small farmer having less than one hectare of land. To improve their quality of life, on-farm production technology has to be supplemented with non-farm technologies, for which suitable extension strategy need to be developed.

Interdependence of Communication and Information Services with Extension Education

To keep pace with the advancement in the information and communication technology the University has established communication centre. Pantagar is the only University to have such a centre in the country. Since neither extension education nor communication centre will be effective in isolation hence, their symbiotic role will be encouraged based on complementary role in both in the effective diffusion of information.

Establishing Mass Media Research Centre

The information and communication technology has changed the scene of educational system in the country where distance education has got the prime importance particularly for those who could otherwise not pursue their higher education in the universities/colleges. This again requires a multi-media approach and vocational education in agriculture and allied fields, like other fields of technical education, will have to be given priority for self-employment. In view of the above facts it will be desirable to start the Mass Media Research Centre for the university education and non-formal education to the farmers, farmwomen and rural youth in the rural areas.

Adoption of Computer-aided Information Technology

The technology development in agriculture has given birth to several complications due to single effort on maximizing production. The soil fertility, availability of water and other natural resources,

health hazards, residual effect of pesticides on human life, animals and soils, and ecological, social and economic situations have undergone drastic change during last 30-35 years of intensive cropping. In view of the changing scenario the technologies have been made specific to the agroclimatic and farming situations of individual farmer. As such, the selectivity of information and technologies in horticulture and making specific recommendation has come up as a major challenge before the farm scientists. To overcome this situation computer-aided information technology will get the prime importance. Some efforts and success have been made in this direction. However, considering vast demand of information for need-based research we are still at the infancy stage. This information demand has to be further tailored with satellite information system, so that the instant benefit of the scientific information could be available to the scientists and extension officials. Since adoption of a new technology is essentially a decision making process, which requires analysis of the situation and resources, consultation and frequent interaction with the farm scientists, the teleconferencing technique between the farmers and related agencies can be helpful in solving emerging problems in agriculture.

Effective linkage between Electronic Media and University

The horticulture since the time immemorial has been subjected to the environment, culture, social and other prevailing situations. The modern horticulture during last 30 years has further demanded for technology development specific to the agroclimatic, soil, food habits and several other factors. The benefit of these location specific technologies should reach the farmers and extension workers as quickly as possible. This is also important in view of the fact that the village-level extension workers have also no easy access to mass media/research stations/universities. Therefore, considering the importance of the transfer of technologies with relevance and consequence, it is desirable that each horticultural university should have some fixed hours for broadcasting/telecasting technical programmes for the benefit of the farmers. The University has been placing its prime importance for localization of electronic media, it would be a high time for the university to have one TV Station and one F.M. Broadcasting Station at all the districts so that KVKs may be made more effective and dynamic in their role in modernization of horticulture.

Establishment of Modernized Printing Unit

Print media is the prime necessity for technology transfer and school education. In view of the high credibility, repeated use and reference value the print media still dominates in education and technology transfer. The students as well as farmers need to be provided with problem-oriented small literature, which may be of immediate utility for the peasants and the students. This can be possible better through application of modern printing technologies. Realizing this need modernized printing unit.

Documentation of Traditional Horticulture and Indigenous Technology through Establishment of Krishi-Sangrahalaya

There is hardly any need to emphasize the importance of indigenous technologies and traditional horticultural system with reference to attaining sustainability in horticultural production. The sustainability does not mean limiting or raising horticultural production but also cope-up efficient utilization of available resources including manpower thereby ensuring more employment/self-employment for the people through combination of modern horticulture with traditional system. To evolve suitable strategies based on this foundation a comprehensive documentation of indigenous technologies/horticulture over the centuries is required. This in fact is a very big task. However, considering the threats of new horticulture it would be desirable to put our priorities on pooling the

past information, experiences, technologies, practices, systems, etc. in a systematic manner so that different fields of horticulture and allied subjects may be benefited for evolving research strategies in the endeavour of search for new technologies for new generation and new horticulture. Most appropriately, it should be done by establishing a Krishi-Sangrahalaya in which the horticulture heritage will be presented in a comprehensive way for information, education and documentation of the technologies, systems, practices, information, etc.

Service through Information Shops

Creating awareness of the information storage and retrieval system and Making need-based information/technologies available to the farmers at their doorsteps is the need of the day. Realizing this need the University plans to reach thousands of villages at low cost using multimedia approach at each centre in the village so that millions of farmers could be benefited in their village itself without wasting time and money.

Zonal Research and Extension Advisory Council Meetings

Interaction of scientists, officers of several line departments like agriculture, horticulture, animal husbandry, fisheries, sericulture, irrigation, seeds, fertilizer and pesticide industries, farmers, voluntary organizations is constantly improved and strengthened through various for a, particularly the meetings of Zonal Research and Extension Advisory Council (ZREACs) every six months and State Level Research and Extension Advisory Council. The ZREAC meetings are convened regularly before the onset of the two main cropping seasons i.e, *Kharif* and *rabi*. The priorities for research and extension activities of each of the seven agro-climatic zones are decided at he ZREAC meetings with due involvements of scientists, officials of the line departments and farmer representatives.

10. TIME FRAME MATRIX OF VISION 2030

10.1. Education

Strategies	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
Strengthening UG programmes				
Increased emphasis on student-centred learning Provision of access to internet, teleconferencing, e-mail and communication facilities	*	*		
Improvement of library and information access facilities by computerizing library operations	*	*		
Inter-library linkages through wide area networking	*	*		
Revision and implementation of intellectually challenging and professionally satisfying and useful curricula to train graduates for scenario across the globe. The emphasis is on skill-oriented instruction and developing critical thinking and analysis	*	*		
Train human resources in core and emerging areas by introducing new UG programme				
Introduction of inter-disciplinary teaching programmes such as Food Science and Technology, Sustainable Horticulture, Biotechnology, Foods, Nutrition and Dietetics, Post-Harvest Technology at UG level	*	*	*	
Training youth and women to acquire practical skills and enable them to serve as grass root level functionaries or entrepreneurs				
Introduction of PG and post-matriculation level diploma courses in several areas in each of the faculties to train rural youth, women and economically weaker sections of society. Establishment of Horticultural polytechnic in all the districts of the state with at least one such institution in each district	*	*	*	
Improving the quality and relevance of post-graduate education by strengthening PG, professional and research programmes				
Revision of course curricula of all the PG degree				

Strategies	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
programmes Introduction of new PG degree programmes:	*	*	*	
i) Master of Horticulture Management		*	*	
ii) Food Science and Technology Soil Sciences and Water Conservation Engineering Post-Harvest Technology Commercial Horticulture Plant Biotechnology		*	*	
iii) Establish Centres of Excellence, Schools of Advanced Studies in which the University has core competence in areas such as 1. School of Crop Improvement 2. School of Resource Management 3. School of Plant Protection 4. School of Basic Sciences 5. School of Social Sciences 6. School of Human Resource Development		*	*	
iv) Increased inter-disciplinary and collaborative teaching and students research programmes	*	*	*	*
Professional development opportunities for teachers to get exposure to recent advances and teaching capabilities				
i) Depute teachers both within and outside the country, for training in teaching methodology and Pedagogy	*	*	*	*
ii) Support deputation of teachers to attend advanced training programmes within the country and abroad	*	*	*	*
iii) Promote joint research programmes, training and academic exchange programmes between the faculty and foreign collaborators	*	*	*	*
iv) Promote organisation of Summer and Winter Schools, and special academic programmes by Teachers	*	*	*	*
Encourage interaction with business leaders and agribusiness trade				
i) Introduce a novel programme of deputing students of UG and PG programme to work in	*	*	*	*

Strategies	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
agribusiness establishments for a period of 2-3 months to gain hands-on experience	*	*	*	*
ii) Invite alumni and leaders in agribusiness to interact with students and faculty	*	*	*	*
iii) Seek and obtain funding for specific research projects and training programmes from agro industries, agribusiness, banks and trade	*	*	*	*
iv) Promote Ph.D. students to carryout research work in identified research and development organisations in the corporate sector	*	*	*	*
Improvement of student amenities and services				
i) Strengthen academic advisory and support services to enable students to perform better in academic, extra-curricular and co-curricular activities	*	*		
ii) Strengthen student career guidance and placement services by providing additional facilities to existing placements cells to enable them to identify employment opportunities, provide information to students on career guidance and employment	*	*		
Provide international/ global exposure to students and faculty				
i) Provide support for participation in international student exchange and study abroad programme. Encourage foreign students to study in the University		*	*	*
ii) Establish academic exchange and collaborative research and teaching programmes with foreign universities and research institutions	*	*	*	*
Strengthen basic student services including student housing and recreation				
i) Invest in the construction of halls of residence for girl students and foreign students in all the major teaching campuses.	*	*		
ii) Provide basic medical care facilities in all teaching institutions.	*	*		

Strategies	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
iii) Provide additional recreational facilities such as indoor games, pavilion, play fields and court for outdoor games in the new college campuses	*	*		
Promote participation of students in extra and co-curricular activities				
i) Promote further the participation of students in National Service Scheme and National Cadet Corp activities by extending these to all teaching campuses	*	*	*	
ii) Depute students to participate in inter-University youth festivals and meets and national and International events	*	*	*	*
iii) Promote increased to participate of students in University sports, games, literacy and cultural meets conducted regularly annually	*	*	*	
iv) Promote increasing use of computer and information technology of fostering IT knowledge and international communication	*	*		
v) Support efforts such as global class rooms by providing video conferencing facilities	*	*		
vi) Encourage faculty to teach and conduct research abroad by extending sabbatical leave facilities and organise and attend international seminars, workshops and meets	*	*	*	*
Encourage specialists and academicians to participate in academic and research programmes of the University				
Proposals for placement of teachers, researchers and experts to visit the University on exchange fellowships, sabbaticals	*	*	*	*
-Strengthen facilities and services for the visiting faculty such as temporary housing, laboratory and transportation facilities. Simplify administrative procedures to promote such exchange	*	*	*	
Technology Parks				
Establish Horticultural Technology Parks	*	*	*	

10.2. Research

Programme: Increasing the productivity of Horticultural crops

Strategy. Evolving high yielding varieties of fruit crops				
Objective	**Time frame**			
	2010 - 15	**2015 - 20**	**2020 - 25**	**2025 - 30**
◆ Clonal/seedling selection in perennial fruit trees	*	*		
◆ Breeding for dwarfing regular bearing habit and free from spongy tissue with quality comparable to Alphonso	*	*	*	
◆ Breeding sapota of dwarf tree size and fruit quality	*	*	*	*
◆ Evolving dwarf banana with slow ripening, greater shelf life and withstanding low temperature, rich in carotene.			*	
◆ Breeding banana for fusarium wilt resistance with quality comparable to Ney poovan.	*	*		
◆ Breeding dwarf guava with red pulp, soft seeds and red skin colour			*	
◆ Breeding spineless pineapple for fruit size and uniformity matching queen	*	*		
◆ Developing pomegranate seedless variety with big juicy aril, having pleasant flavour, moisture stress tolerance without fruit cracking and aril browning				
◆ Breeding dwarf gynodioecious types of papaya with good shelf life and high carotene and deep pink colour				
◆ Evolving self thinning Thompson seedless type grapes for export.	*	*	*	
◆ Development of root stocks tolerant to water stress, salinity and alkalinity	*	*	*	
◆ Evolving techniques for mass multiplication of genuine and disease free planting material	*	*	*	*
◆ Production technologies for yield enhancement	*	*	*	*
◆ Identification of rootstocks for tree size control sustained productivity under soil biotic and aboitic stresses (ex.grapes)	*	*	*	*
◆ Identification of pollinations and pollimizers suitable for improving the fruit set and enhance the income to orchardists.	*	*		

Objective	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
◆ Developing the appropriate models of substrate dynamics for different crops/ horticultural eco systems	*	*	*	
◆ Exploiting the yield potential of under utilized horticultural crops	*	*	*	*
◆ Developing fertigation schedules	*	*	*	*
◆ Evolving techniques for high density orcharding	*	*		
◆ Standardization of organic farming and bio dynamic farming	*	*	*	
◆ Off season production of commercial mango varieties	*	*		
◆ Enhancing fruit set control of fruit drop for higher productivity in mango	*	*		
◆ Technology for rejuvenation of old orchards for enhancing productivity in fruits	*	*		
◆ Mechanism of vigour regulation in fruit crops (Ex.Mango)	*	*		
◆ Fruit crop based cropping systems for efficient land use	*	*		
◆ Developing fruit crop based cropping systems for watershed areas	*	*		
◆ Development of integrated production strategies in papaya for periurban areas	*	*		
◆ Development of integrated nutrient and water management practices for table and wine grapes	*	*		
◆ Generating leaf nutrient guides and package of practices in fruits	*	*	*	
◆ Developing DRIS in fruits	*	*		
◆ Detection of micro nutrient disorders and their control in fruit crops	*	*		
◆ Standardization of propagation techniques for large scale multiplication of identified less known fruit trees	*	*		
◆ Improvement of presently available varieties/ cultivars and land races suitable to various agro-climatic and crop growing situations for higher yields. The yield levels to be increased at a minimum of 30% over the existing, with				

Objective	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
sustainability in vegetables, ornamentals and medicinal crops	*	*	*	*
◆ Exploitation of hybrid vigor and develop F_1 hybrids with higher yields with an yield advantage of about 50% in vegetables.	*	*	*	*
◆ Evolving high yielding varieties/hybrids using biotechnological tools resulting in genetically modified vegetables.	*	*	*	*
◆ Breeding indigenous varieties in roles, carnation, gerbera, anthurium etc., with quality on par with exotic varieties *	*			
◆ Evolving techniques for large scale production and assessing the purity of seeds of improved varieties	*	*		
◆ To develop integrated nutrient and water management systems involving micro irrigation and fertigation in vegetable, ornamentals and medicinal crops	*	*		
◆ Improve labour use efficiency in hybrid seed production in vegetables	*	*		
◆ Sustainable production under various cropping systems	*	*		
◆ Nutrient use efficiency in cropping systems	*	*		
◆ Organic production technologies of selected vegetables, ornamentals and medicinal crops	*	*		
◆ Identification of varieties for problematic soils	*	*		
◆ Micro propagation techniques in rose and other difficult to propagate ornamentals	*	*		
◆ Identification of economic injury levels due to pests and diseases to plan optimum dosages of plant protection measures under natural calamities like out-break of pests, disease epidemics, viral spreads etc.	*	*		
◆ Insect pest forecasting and also pest resistance mechanism to plan spray schedules.	*			
◆ Development of online databases and information system for insect pest management	*	*	*	
◆ Integrated management of nematodes with biopesticides	*	*		

Objective	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
◆ Sustaining productivity of horticultural crops by evolving varieties/ hybrids resistant to various biotic stresses using conventional breeding methods/ biotechnological tools	*	*	*	*
◆ Developing Integrated Pest and Disease Management practices using botanicals, bio-control agents and micro-organisms in vegetables	*	*	*	*
◆ Development of maps of diseases and yield loss estimation	*	*		
◆ Epidemiology and disease forecasting models for major diseases	*	*		
◆ Development of immuno-logical and molecular diagnosis kits for economically important diseases	*	*		
◆ Development and mass production of bio control agents	*			
◆ Development and application of PGPR for management of soil borne diseases	*	*		
◆ Exploitation of mushrooms for bioremediation	*			
◆ Evolving technologies for sustainable production of horticultural crops under rainfed condition, high temperature and problematic soils	*	*	*	*
◆ Mechanism of water, stress, heat and salinity tolerance in vegetable crops	*	*		
◆ Developing production technologies under adverse situations like; drought high temperature, saline and problematic soils	*	*		
◆ Methodologies for cultivation in non-traditional and degraded land	*	*		
Minimize the post harvest losses through – ◆ Evolving varieties/ hybrids having higher shelf life and long transportation qualities	*	*	*	*
◆ Evolving pre-harvest technologies to reduce post harvest losses	*			
◆ Increasing shelf life by standardizing post harvest treatment and practices	*			
◆ Storage studies on organically grown products	*	*	*	*

Objective	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
◆ Identification of organism causing post harvest spoilages/decay and standardizing protocols to prevent the spoilages.	*			
◆ Evolve varieties suitable for processing	*	*	*	*
◆ Evolve technologies for value addition in various forms like RTS, Carbonized drinks, juices, condiments, dehydrated products, canned products, frozen products etc.	*	*	*	*
◆ Processing of under utilized fruits	*	*	*	*
◆ Horticultural waste product utilization	*	*	*	*
◆ Evolve precision farming schedules for input usage	*	*		
◆ Evolve packages, good horticultural practices for commercially important crops	*	*		
◆ Develop technologies for optimum use of inputs like water, nutrition, pesticides and other inputs with an integrated approach	*	*		
◆ Develop varieties / hybrids for lean and off-season and for poly house cultivation (ex: bhendi, peas, capsicum, chrysanthemum, etc.)	*	*	*	*
◆ Production of horticultural crops under protected conditions for round the year production	*	*		
◆ Develop technologies to produce fruits, vegetables, flowers having uniform, size, shape and appearance (colour) to fetch premium price and to become more quality competitive in the international market this increasing exports.	*	*	*	*
◆ Extraction of antioxidant from horticultural wastes	*	*		
◆ Assessment of active principles from fruits, vegetables and medicinal crops for providing nutrients/ antioxidants and further synthesis of the same	*	*		
◆ Develop varieties/ hybrids resistant to various insect-pests, nematodes and diseases	*	*	*	*
◆ Develop Integrated Pest Management and Integrated Disease Management protocols using trap crops, botanicals pheromones, bio-control agents, micro organisms to reduce the pesticide load on the products	*	*	*	*

Objective	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
◆ Substrate dynamics in sustaining the productivity levels to ensure efficiency of inputs	*	*	*	*
◆ Reduction of toxic and heavy metal contamination in soil and water	*	*		
◆ Identification of scavenger plants for reduction of urban affluents	*			
◆ Developing varieties for exports thus ensuring export promotion and import restrictions	*	*	*	*
◆ Market intelligence and price forecasting	*	*	*	*
◆ Export performance of fresh and processed produce for direction and quantum	*			
◆ Economics of horticulture based farming systems	*			
◆ Economics of peri urban horticulture	*			
◆ Total factor productivity analysis	*			
◆ Information system for germplasm	*	*	*	*
◆ Stability model for vegetable research	*			
◆ Development of software for disease and pest forecasting	*			
◆ Bioinformatics resources for horticultural crop research	*	*		
◆ Develop modules for pest forecasting	*	*		
◆ Pest risk analysis for placement of pesticides to reduce cost of production	*	*		
◆ Development of resistance to pesticides by the pests and further resistance mechanisms	*	*		
◆ Identify technological gaps	*	*		
◆ Efficient transfer of technology for ensuring adoption	*	*	*	*
◆ Impact assessment of technologies in socio metric and economic modes for further refinement with PRA	*	*	*	*
◆ Developing and testing of e-leaning modules for horticultural crops	*	*		

10.3. Extension

Strategies	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
Achieve high rate of adoption of new technologies by the farmers				
Farming systems approach using participatory method with full involvement of research scientists, extension officers and farmers	*	*	*	
Special drive in organizing training programmes to improve skills and methods to reduce drudgery of farm women (performing 80% farm operations though account for only 50% of rural population)	*	*	*	*
Technology assessment and refinement to make it feasible for easy adoption by small and marginal farmers	*	*	*	
Agenda for District Horticultural Advisory and Transfer of a technology Centres (DHATTCs)				
• To develop horticultural communication management system to respond to new	*	*		
• Information needs of farmers	*	*		
• Modernization of press	*	*		
• Publication of monthly Telugu Magazine/ journal	*	*	*	*
• Publication of diagnostic manual for field workers	*	*		
• To strengthen the centres with full fledged audio-visual aids van and transport facilities	*	*		
• Establishment of Technology Information Museum	*	*		
Single window approach through establishment of Agriculture Technology Information Centre (ATIC)	*	*		
Establishment of zonal level training institutes/ technology parks	*	*		
Distance Education Extent the technology through more number of TV channels	*	*		
Establishment an exclusive production unit at University Headquarters to cater to the needs of farming community in different agro climatic zones by developing suitable programmes for Television, Radio and Video.	*	*		
Working out appropriate methodologies for technology transfer based on specific and emerging needs and implementing the same	*	*	*	*

Programmes and Time Frame for Library and information services

Strategies	Time frame			
	2010 - 15	2015 - 20	2020 - 25	2025 - 30
Computerization of the main library, internet connectivity, Establishment of LAN	*	*		
Computerization of college libraries and major research stations,	*	*		
Establishment of Wan and Internet connectivity at all colleges and research stations	*	*		
Strengthening book collection at all colleges and research stations	*	*	*	
Digitizing all dissertations and other university documents	*	*	*	
Establishing students computer labs	*	*	*	
Computerization and servicing	*	*	*	*

11. LINKAGES, CO-ORDINATION AND EXECUTION ARRANGEMENTS

11.1. Linkages

The university has already established linkages with various ICAR institutes, State Agricultural and Horticultural Universities, other Research organizations like Department of Science and Technology Department of Biotechnology, CSRI, APEDA, CDB in order to have an integrated approach towards sustainable development of horticulture. These linkages would be further strengthened to achieve a common goal i.e., horticulture development. Linkages will be developed with international agencies like World Bank, FAO, AVRDC, IPGRI etc., to bring about various issues of research of common interest in a network mode.

11.2. Coordination and execution arrangements

The Horticultural University shall establish close linkages with International institutes, National institutes of ICAR, other National Institutes of Government of India for training of the faculty in specialized areas, for improvement of academic standards.

Presently the applied and location specific research is being carried out under coordinated-multi disciplinary mode. The emerging areas of research and gaps identified under strategic and anticipating nature would brought under net work mode, and executed under identified crop specialist. Outsourcing of technologies already available will be done to accelerate the research and also further strengthen the bilateral relation. The Director of Research and research review teams will monitor the execution of programme with periodical reviews.

12. CRITICAL INPUTS

12.1. Funds

The funds would be drawn from plan allocations through ICAR-All India Coordinated Research Projects for all the new programmes to be initiated. Funds will also be drawn from the non-plan (state plan) to continue the committed programmes. Funds will be drawn from the external funding agencies like DBT, DST, APEDA, CDB, NABARD, State Government organizations and also from International agencies like FAO, World Bank, IPGRI, AVRDC etc. Resource mobilization and revenue generation would be given highest priority. Adhoc problems in education and research arising would be solved by getting projects from cess funds.

12.2. Manpower

The university started functioning with a sanctioned strength of 526 staff including 138 teaching/ Research staff now, it has a total strength of 665 staff consisting 177 teaching/ research staff.

12.3. Human Resource Development

The university is involved in under graduate and post graduate education in horticulture by way of offering courses leading to B.Sc. (Hons.) Horticulture, M.Sc's and Ph.D's. The educational activities would be further intensified by having collaborative educational programmes with other state Agricultural / Horticultural Universities, Central Institutes, Institutes of Excellence across the country. Efforts will be made to establish centre of excellence in Horticultural Education.

To carry out the perspective plan given above, expertise has to be upgraded in various areas viz., biotechnology, latest techniques of soil and plant analysis, techniques of large scale protected cultivation, modern techniques of growing crops in extreme stress conditions, high tech pest and disease forecasting modules etc. Advanced training facility for many of these latest techniques are not available in India and so it is essential to depute some scientists abroad for training in recognized centres of excellence.

Efforts will also be made to establish advanced centre of excellence in Horticultural Research and Extension at university campus through which the human resource will be trained in various aspects of horticulture research and development.

13. RISK ANALYSIS BASED ON SWOT

Risk analysis studies will be initiated periodically on the emerging issues and threats in education, research and extension activities. Good horticultural practices (GHP) will be developed to meet the standards quantitatively and qualitatively. A university technology management unit will be develop which in turn will look after the policy issues related to IPR and further commercialization of technologies developed by the university.

14. PROJECT REVIEW, REPORTING, EVALUATION ARRANGEMENTS

The university Board of Management, Academic council and Research and Extension Council would be reviewing the implementation and progress of the teaching, research and extension works being carried out in the light of the perspective plan of vision 2030 of APHU. Monitoring and evaluation cell will also be established for more accountability is being brought in implementation of perspective plan by critical evaluation of the performance of the staff in particular and the university as a whole.

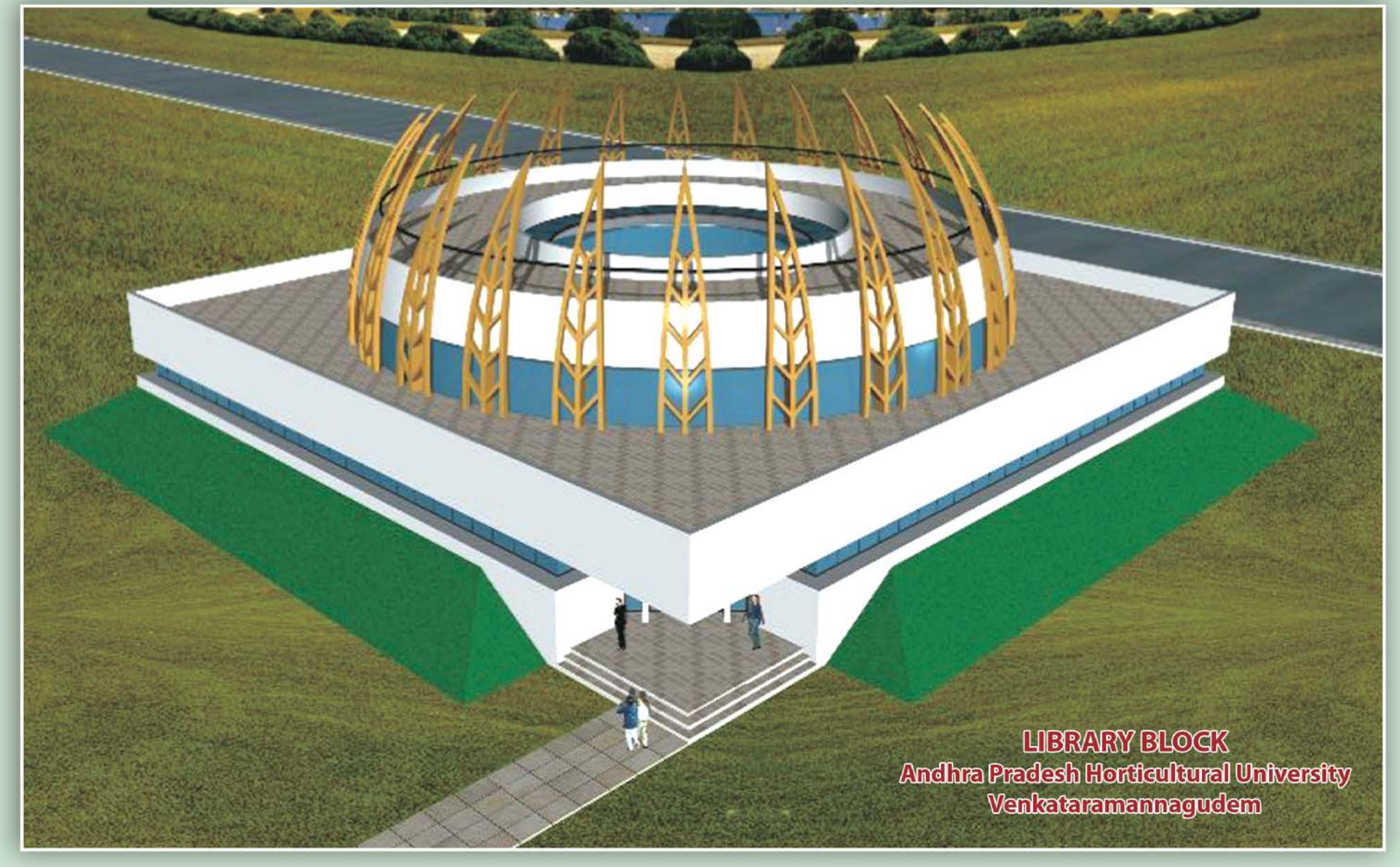
15. SPIN-OFFS (EXPECTED OUTCOME)

The execution and implementation of various programmes envisaged will result into the increase of food security, nutrition security and prosperity of the state. Socio-economic upliftment of small and marginal farmers of the state will be achieved with reduction in inter-regional disparities in general and tribal belts in particular. This will also reverse the process of degradation of natural resources to promote sustainability. It ensures greater congruence of enhanced productivity, sustainability, profitability and equity. Dynamic horticultural research and development policies and linkages will be in place to ensure realization of the potential of the various technologies and products. The major outputs under education, research and extension are.

Graduates and Post graduates in specialized fields of horticulture, with excellent academic standards will be created from this university, they become National/ Global trainers in horticulture as this university is happens to be second horticultural university in the country.

Public-private partnership is gaining more prominence in the development of horticulture in the country. All the technologies developed by the university will be categorized into public and private domain. All the technologies under public domain are transferred to the farmers and other stake holders with the participation of development agencies. The technologies under private domain would be taken up for further commercialization to corporate houses, trade organizations and private industries at cost either on exclusive / non exclusive transfer of rights or on profit sharing basis patenting and registration of technologies, will be sold / transferred to private parties on royalty basis.

All the technologies generated by the university which are categorized under public domain would be made available to farmers and end users. The seed and planting material production unit will be strengthened through which seeds / planting material of all the varieties / hybrids will be produced and distributed to the farmers at cost. Transfer of technology machinery will be strengthened and periodic training programmes will be offered to development personnels and extension officers. e-horticulture will be made available to farmers and end users.


LIBRARY BLOCK
Andhra Pradesh Horticultural University
Venkataramannagudem

ACADEMIC BUILDING Andhra Pradesh Horticultural University, Venkataramannagudem