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Anand Agricultural University Anand - 388 110 (Gujarat) India

Vision 2050

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Shri O. P. Kohli Governor of Gujarat



Raj Bhavan Gandhinagar - 382 020

Message

It is heartening to know that the Anand Agricultural University is publishing "AAU Vision 2050" document which is a comprehensive road map with a potential to transform agriculture towards greater prosperity.

I know that Anand Agricultural University has a glorious history of committed research and education in the field of agriculture and allied sciences and that it has contributed immensely for the welfare of the farmer community. Its increasing visibility at the national and international levels with well-deserved recognitions is a matter of happiness.

The Indian agriculture has been contributing significantly towards providing nutrition and livelihood security for millions of families across the country. In such a scenario, a convergence of the various disciplines of agriculture and allied sciences is the need of the hour to achieve twin objectives of maximum utilization of available resources and of achieving livelihood security.

In this age of globalization, the role of Agricultural Science has become very crucial. It is important to bring a paradigm shift in the syllabus, academic approaches and research priorities in the agriculture sector.

As Chancellor of the AAU, I compliment the foresightedness shown by the Vice Chancellor and the efforts put in by his team in bringing out this publication. This is a good example of the continuous enthusiasm and commitment of the University's faculties towards achieving academic excellence.

"AAU Vision 2050" provides strategic framework for innovation-led inclusive and sustainable agricultural growth which would greatly help the present and the future generations in following the laid down road-map with a focused approach.

I extend my best wishes to the Vice Chancellor and his team, students, scientists and administrators for this initiative and hope for the success of their future endeavours.

Of Kouly

(0. P. Kohli)





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Vision 2050





Dr. N. C. Patel Vice Chancellor



Anand Agricultural University Anand - 388 110

Foreword

An accelerating agricultural growth is the pre-requisite for inclusive growth, reduction of poverty levels, and socioeconomic status of the stake holders. The inclusive growth can be achieved only with higher agriculture growth, for which, agricultural education, research and extension must be at the center of reform agenda. Therefore, it is necessary to adopt required strategies so as to facilitate the balanced growth of the sector at the state and national levels. Globalization, privatization, reduction in agricultural land area, food and nutritional securities, industrial and market driven quality of agricultural commodities, etc. are few of the areas of concern, all of which enormously increase the scope and thus the opportunities of agricultural development.

Over the years, Anand Agricultural University has steadily built a strong academic tradition. It is evident from the impressive statistics in terms of various indicators such as being ranked at 40th position amongst all the universities and at 62nd position in overall category at national level by the National Institutional Ranking Framework (NIRF) in 2017 conducted by the Ministry of HRD, Government of India. ICAR has also placed AAU at 20th rank amongst all the agricultural universities of the country. Very recently, AAU is one of the four agricultural universities of the country and the only university from Gujarat which has been considered by UGC for submitting the proposal for Institution of Eminence to place it as the world class institution. Thus, AAU is nationally recognized for delivering excellent education at the undergraduate and postgraduate levels as well as research, and is committed to provide excellent human resource to meet national needs and global expectations.

AAU provides high quality education in the field of Agriculture, Horticulture, Veterinary, Dairying, Agricultural Engineering, Food Processing, Agricultural Information Technology, Agribusiness Management and others. The University so far has developed 1025 need based technologies including 63 high yielding varieties of different crops to enable farmers to reap higher yield with better quality. AAU's activities have been expanded to span newer and frontier areas of research involving biofertilizer, bioactive compounds, biocontrol agents, genome sequencing in plants and animals, fermented functional foods, nanotechnology, distant hybridization etc along with necessary focus on rice, maize, tobacco, vegetable crops, fruit crops, forage crops, animal breeding, nutrition and dairy and food products. The core of AAU's operating philosophy is to create the partnership between the farmers and committed academics and scientific research as the basics for sustainable agricultural development in the country in general and in the region in particular. AAU has a well-defined time-tested system of academics and administration of various activities related to education, research and extension and is well placed for ushering into new era of agriculture based developmental activities.

In view of the above, 'Vision 2050' has been conceptualized and prepared with an aim to pursue academic excellence and provide leadership at national and international levels, targeting quality education, research, capacity building, consultancy and innovative outreach to benefit the diverse Gujarati, Indian and global community in the field of agriculture and allied sciences. The primary focus is on developing amiable environment to motivate students, scholars, academicians and researchers to work on problems related to Indian agriculture and allied sciences, thereby developing high quality academic ingredients in various niche areas. This will not only result in development of skilled, motivated and competent human resources to meet demands of diversified agriculture and allied sectors, but also search for new frontiers of science, technology and innovation for agriculturally prosperous Gujarat and India.

Through 'Vision 2050', the present and future generations of faculty, scientists, students and administrators of AAU will be able to define and design the course of desirable actions so as to set the agenda for their efforts and contribution in building the state and the nation through agriculture based endeavours.

Platel (N. C. Patel)

Place : Anand Date : 08.12.2017



Dr. K. B. Kathiria Director of Research & Dean P. G. Studies



Anand Agricultural University Anand - 388 110

Preface

As a part of progressive attitude and continuous strive for excellence, Anand Agricultural University is periodically brain storming for preparing itself to face the future challenges and thereby update its strategy for better output through agricultural education, research and extension activities. It is always important for an institution to identify the gaps prevailing and lay down a well thought plan for the present and future generations, so that the Institute's efforts and achievements remain in line with the changing demand and scenario in future.

VISION 2050 has been visualized and prepared keeping in mind fuller utilization of AAU's existing capabilities/infrastructure coupled with deeper and broader collaborations and consortia with a trans-disciplinary approach by engaging best brains. There remains a big array of such parameters which will be attempted thorough enormous activities in the domain of research, education and knowledge disseminations for creating quality human resources and their employability.

VISION 2050 includes focused descriptions of 'Current Agricultural Status of Central Gujarat', 'AAU – Current Status', 'Strengths & opportunities', 'Vision 2050', 'Strategies & Framework' and 'Way forward'. The document lays down the important thrust areas and strategies to incorporate the discipline wise identified focused measures for better outcome of the University activities. For better understanding of the proposed measures and steps for future development, the initial chapters explain the current agricultural status of central Gujarat region as well as of AAU with its strengths and opportunities, so that the proposed visionary steps can be convincingly correlated.

I thank the Hon. Vice Chancellor Dr. N. C. Patel, for conceiving the idea and the basic philosophy behind preparing such an important document, placing AAU well ahead in making such an effort. I appreciate untiring efforts made by Dr. M. K. Jhala, Associate

Director of Research, AAU, Anand, for editing and improvising the whole document. The contribution made by all the conveners of various chapter wise subcommittees and the members have also been noteworthy, which has helped us to give a better shape to the document. I thank all those involved directly or indirectly, actively or passively in the process of preparing AAU VISION 2050.

I am confident that VISION 2050 would help the researchers, academicians and extension educationists of AAU to improvise upon their scientific and academic inputs and thus contribute in AAU's increasing visibility at the national and international levels by keeping pace with the time and changing agricultural scenario.

Aleathiki

(K. B. Kathiria)

Place : Anand

Date : 08.12.2017

AGRICULTURAL STATUS OF CENTRAL GUJARAT

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Mankind faces numerous challenges and most of them are linked to food security of the exploding population which is expected to cross 9 billion mark by 2050. Globally, the contribution of agriculture to Gross Domestic Product (GDP) is declining, but agriculture still supports the livelihood of more than 2.6 billion people in the world, living mostly in rural areas. Changing climate is putting more pressure on the natural resources we depend on, and the safe space for operation within the planetary boundaries of earth's resource system is shrinking. It is time to rethink on how food will be cultivated, processed, distributed and consumed till 2050.

A profound change in the global food and agriculture system is must to feed today's 925 million hungry people, of which 230 million live in India. About 2 billion people are expected to be added to this category by 2050, mostly in developing countries, if corrective measures are not applied. Sustainable agriculture is central to everlasting development and the judicious application of science and technology can help to achieve "zero hunger" goal even before 2050.

accelerating agricultural An growth is the pre-requisite for inclusive growth, reduction of poverty levels, development of the rural economy and enhancing of farm incomes in rural areas of the country including Gujarat. The growth with inclusiveness can be achieved only when agriculture growth accelerates and is also widely shared amongst people and regions of the country by keeping agriculture at the centre of reform agenda. Therefore, it is necessary to evaluate the performance of the agriculture sector periodically to





find out the bottlenecks and adopt required strategies so as to facilitate the balanced growth of the sector at the state and national levels.

Gujarat constitutes about 6.2 % of total geographical area and 4.99 % of total population of India. As per Census 2011, about 3.47 crore people of the state live in rural areas constituting about 57.4 % of its total population. About 70.5% of total workers in the state are rural based. Gujarat has been the front-runner in the overall economic development of the country and contributes to 21 % of the country's exports, 11 % of industrial production and 6.42 % of the national GDP at constant prices. Agriculture continues to be the primary occupation for the majority of rural people in the state. About 51.8 % of total workers are farm cultivators and agricultural labourers. Thus, agriculture in the state has been a major source of labour absorption. Moreover, agriculture provides indirect employment to a large portion of population in agro-based occupations. Hence, prosperity and well-being of people in Gujarat is closely linked with agriculture and allied activities. The State is endowed with abundant natural resources in terms of varied soil, climatic conditions and diversified cropping pattern suitable for agricultural activities. Gujarat economy has exhibited a healthy growth path during the recent years.

Gujarat is known as the growth engine of the country and is one of the fastest growing states of India. It is one of the most prosperous states of the country having a per-capita GDP three times India's average and stands fourth in the country in terms of per capita agricultural output. The State recorded double digit growth in the economy continuously for ten years. Gujarat has proved to be successful in implementing the agricultural policies and made significant strides in agriculture through modernization, diversification, and good infrastructure for production and marketing, especially for milk, horticultural crops and cash crops.

CENTRAL GUJARAT REGION

Gujarat state is divided into 8 agro-climatic zones based on the characteristics of their agriculture and climate. In terms of climatic types, central Gujarat area is classified as tropical sub humid and semi-arid. The winter is mild cold whereas summer is hot. The maximum temperature



ranges from 26.0 to 40.1°C, while the minimum temperature varies between 10.8 and 27.4°C. Central Gujarat receives precipitation from June to September through the south west monsoon. The well distributed monsoon season helps in cultivation of paddy, maize, tobacco, cotton, pigeonpea, and minor millets as *kharif* crops, and wheat and gram on conserved soil moisture as *rabi* crops in Bhal area.

Geographical Distribution

Central Gujarat has North Gujarat region on Northern side, South Gujarat region in Southern side and Saurashtra region & Arabian Sea coast i.e. Gulf of Khambhat on the western side. It has major plain land core covered with hilly tribal belt at Eastern side bordering with Rajasthan at North East and Madhya Pradesh at Eastern side. The area is gently sloping to almost flat near the Gulf and is a fully developed and fertile alluvial tract. The overall topography of the area is more or less plain, except river courses where the topography is undulating. The alluvial plain is a product of the age long processes of erosion and deposition by the major rivers of southern and central Gujarat flowing westwards to the Gulf of Khambhat.

Population

In central region of Gujarat state, there exists marked variation in agro-ecological situations and diversity in socio-economic and cultural habits. The total population of central Gujarat region is 13.44 million as per 2011 census with a density of 215 people per km living in 5124 villages spread over in nine districts. The overall literacy in the central Gujarat region is 68.20 %.

Climate

Central Gujarat has semi-arid to moderately humid climate, and falls in the subtropical climate zone with three distinguished seasons i.e. *kharif* (June to September), winter (October to January) and summer (February to May). The majority area lies between Sabarmati and Narmada rivers.



The climate of this area is characterized by a hot summer and general dryness, except during the south-west monsoon season which experiences heavy rain.

During summer season, the maximum temperature goes beyond 41°C and minimum temperature falls to 26°C. In winter season, minimum temperature occasionally goes below 8°C and maximum temperature up to 34°C. Thus, there is a considerable variation in average temperature during different seasons in the region.

All the parts of central Gujarat receive the rainfall through South-West monsoon which normally starts from middle of June, with maximum rainfall in the months of July and August. The rainfall declines in the month of September and the distribution of rainfall has been extremely uneven and irregular. The rainfall of the region ranges from 800 mm to 1000 mm. The low pressure, depressions developing over the Bay of Bengal during monsoon months and moving north-to-north west also bring rains to this part of the state. About 10-15 % of the annual rainfall is received in June, nearly 40 % in July, 30 % in August and 10-20 % in September.

Soils

The soils of central Gujarat are sandy loam to loam or clay loam to clay in midland, floodplains and saline at the coastal area. The soils of Ahmedabad, Kheda, and Anand districts are highly fertile sandy loam soil locally called *Goradu*. The *Goradu* region is very fertile in raising crops with high production. The soils of Vadodara and Chhotaudepur districts are moderately drained deep black soil on eastern part. The soils of Mahisagar, Panchmahal and Dahod districts are medium black and hilly soil. At western part of Anand and Kheda districts, the soils are moderate to deep saline sodic near Khambhat.

The soils of central Gujarat belong to fine to coarser in general. The soils of Anand, Kheda, Panchmahal and Dahod districts are predominantly medium textured (loamy) followed by fine textured (clay). The soils adjoining to Anand, Kheda, Panchmahal and Dahod districts are coarser (sandy). In Vadodara district, the soils are predominantly fine textured (clay) followed by medium textured (loamy) and coarser (sandy) towards



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adjoining areas of Vadodara and Dahod districts. Soil drainage in Anand, Kheda and Panchmahal districts are well to moderately drained, where as in Vadodara and Dahod districts, it varies from well drained to moderately drained followed by somewhat excessively drained.

The soils of western parts of Anand districts are medium saline in nature and slightly saline towards north. The soils in Kheda district and western parts of Vadodara district are of slight to moderate saline nature. The soils in Vadodara, Anand and Kheda districts are slight to moderate saline, where as in Panchmahal and Dahod districts, the soil salinity is moderate. In general, the soils are slightly sodic in all districts of central Gujarat.

The soils are low in nitrogen, medium in phosphorus and high in potassium. Many districts like Kheda, Panchmahal and Vadodara show medium nitrogen fertility. The soils are broadly classified in to five groups, viz., (i) sandy loam to clay loam, (ii) medium black, (iii) deep black, (iv) saline alkaline and (v) hilly.

The land is almost flat plain made up of alluvial soil except for some hilly areas of eastern parts of Dahod, Panchmahal and Vadodara districts adjoining Rajasthan and Madhya Pradesh. The perennial rivers are Narmada, Mahi, Panam and Sabarmati.

Land utilization

The geographical area of central Gujarat is about 33 lakh ha (16.84% of the state) and cultivable area is 14.87 lakh ha. The major crop grown is paddy which occupies 18.4% of the gross cropped area, followed by cotton (16.5%), maize (15.3%), pigeon pea (7.4%), bajra (6.7%), tobacco (1.8%) and vegetable crops (2.2%). In middle Gujarat, dairy and poultry farming are established as important agricultural occupations.

The land use pattern of central Gujarat agro climatic region is as follows.

- Net sown area: 65.45%
- Forest: 10.22%
- Non agriculture use: 9.05%
- Cultivable fallow: 5.94%

- Cultivable waste land: 5.31%
- Pasture and grazing land: 3.81%
- Miscellaneous: 0.22%

Agriculture crops

Gujarat has a diversified agricultural economy. The state agriculture economy has witnessed a shift towards high value crops like cotton, groundnut, fruits, vegetables, condiments and spices from low value cereals and other crops. Food grain production is estimated about 626.23 lakh tons in year 2016-17. The estimated production of cotton bales each of 170 kg is estimated about 94.00 lakh and of oil seeds about 41.79 lakh tones.

In central Gujarat, crops generally grown are Rice, Wheat, Perl millet, Sorghum, Maize, Greengram, Pigeonpea, Groundnut, Sesamum, Castor, Cotton, Chilies, Chickpea, Tobacco, Potato, Tomato, and Mustard.

Horticulture crops

Horticulture is a priority sector in agriculture as it has the potential for improving the socio-economic conditions of the farmers. Horticulture economy has been gaining a momentum as the area under fruit crops, condiments, spices and floriculture is increasing rapidly. This has resulted in an enhanced share of horticulture to total state agricultural economy. At present, horticultural crops contribute about 20% to total agricultural economy. The major vegetables grown in Gujarat are onion, potato, brinjal, tomato, okra and cucurbits. The state also produces spices viz. cumin, fennel and corinander. The productivity of onion, tomato, banana, potato and pomegranate in the state is maximum at national level. The state has also introduced new horticulture crops like cashew nut, pamaroza, sweet orange and medicinal crops. Onion dehydration industry of the state is biggest in the country. In floriculture, flowers like carnation, gerbera and rose are cultivated using Hi-Tech Green Houses. The state enjoys monopoly in processing of Isabgul. During the year 2016-17, the production of fruits, vegetables, spices and flowers was estimated to be 89.53, 131.61, 9.23, and 1.96 lakh tons, respectively.



The horticulture sector of central Gujarat has large number of agro based industries generating skill based employment and self-employment opportunities both in rural and urban areas of the middle Gujarat region.

Horticultural Crops of Central Gujarat

Fruits : Mango, Kagzi Lime, Banana, Papaya, Aonla, Custard apple

Vegetables : Brinjal, Tomato, Chilli, Okra, Cucurbits, Drumstick, Leguminous Vegetables, Cabbage, Cauliflower

Spices : Ginger, Cumin, Corinander, Turmeric

Flowers : Rose, Spider lily, Marigold, Gaillardia, Jasmine, Chrysanthemum, Gerbera, Carnation

Medicinal/Aromatic : Safed Musali, Alovera

Animal Husbandry and Dairying

India has largest population of livestock in the world with a livestock base of 512.69 million including 190.90 million cattle, 108.70 million buffalo, 65.07 million sheep and 135.17 million goats. In goat population, India ranks second in the world with a goat population share of 26.40% in India's livestock population. The total poultry population in the country is 729.20 million numbers (19th livestock census, 2012). Indian poultry industry is also emerging as the world's 2nd largest market with a production of 69.73 billion eggs and 5.9 million tons of poultry meat. Overall, the Indian livestock is growing at a fast pace and emerging as a significant contributor to the global market.

Animal husbandry plays a vital role in Gujarat's rural economy, especially for the small and marginal farmers, contributing nearly 5% to the state GSDP (NDDB, 2014) and around 29.20% to the agriculture NGDP of India (Annual Report 2016 – 17, DADF). The total livestock population has decreased by about 3.33% over the previous census at national level; however it has increased substantially in Gujarat (15.36%) (19th livestock census, 2012).

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India has total 160 breeds of domesticated animals. Gujarat is one of the most important state harbouring diversity of 20 domestic animal breeds, some of which are on the world map of very important breeds having well differentiated characters that enriched global biodiversity (www.nbagr.res.in). Gujarat has valuable genetic resources of cattle (Gir, Kankrej and Dangi), buffalo (Mehsani, Jafarabadi, Surti and Banni), sheep (Patanwadi, Marwadi and Duma), Goat (Kachchhi, Surti, Zalawadi, Mehsani and Gohilwadi), Horses (Kathiawari, Marwari, Kachchhi-Sindhi) and camel (Kachchhi, Kharai and Bikaneri) as well as indigenous poultry breeds. In Gujarat, almost 70 – 80% bovine population belongs to well defined specific breeds like Gir, Kankrej, Dangi, Surti, Jafarabadi, Mehsani, Banni, etc.

The livestock sector in Gujarat is comparatively more vibrant than the other states and has higher growth rate than national average. Animal husbandry is an important occupation adopted in rural sector after agriculture. The state is known for cooperative dairy sector and is well appreciated in the world through "Amul Pattern". The livestock sector is poised to grow at a rate of 6 to 10% and Gujarat is emerging as a forerunner in livestock enterprise. India ranks first among the world's milk producing nations with annual production 155.49 million tons in the year 2015 – 16. Gujarat ranks fourth position among the top ten milk producing states of India with 12.26 million tons in year 2015 - 16 (www.nddb. org). This represents sustained growth in the availability of milk and milk products for our growing population. Dairying has become an important secondary source of income for millions of rural families and has assumed the most important role in providing employment and income generating opportunities particularly for marginal and women farmers. Most of the milk is produced by animals reared by small, marginal farmers and landless laborers. While, retaining the distinction of highest milk producers of the world for the last decade, it is now well accepted fact that the animal



husbandry and dairying play an important role in the national economy, significantly supplementing the family income, contributing to household nutritional security and generating gainful employment for 22.45 million people in principal and subsidiary status, mostly women.

The distribution of livestock asset value is proved to be more equitable than land. In numbers, marginal and small land holders comprise 63% of rural households but account for only 34% of the arable land. In contrast, they account for 67% of the bovines, 65% of the ovines, 70% of the pigs and 75% of the poultry. Livestock in such households not only serves the purpose of augmenting income, employment and food security, but also acts as a storehouse of capital and an insurance against crop shocks. Besides, livestock enterprises being women oriented, have promoted gender equity. With an estimated production of 155.49 million tons of milk in current year, the value output from livestock sector at current prices stands at about 29.20% of the total value of output of agriculture and allied sectors. Two third of this was contributed by the milk sector alone (Annual Report 2016 – 17, DADF).

Livestock sector helps to women empowerment by providing constant and regular income to rural women. Out of 101 lakh families of the state, 42 lakh families (41.58%) are concerned with animal husbandry occupation from which 13.60 lakh families (13.46%) are Below Poverty Line (BPL). The animal husbandry is the sole income source to such BPL families. Livestock production has significant contribution in Gujarat, as there is substantial increase in livestock products and byproducts. There is increase in the population of livestock and poultry respectively to 8.55% and 64% as per livestock census of year 2012 as compared to the previous census of 2007. The livestock population of Gujarat and central Gujarat as per 2012 census is as per the following table (19th livestock census).

| Vision 2050 | |
|-------------|--------------------|
| | (In million) |
| GUJARAT | CENTRAL GUJARAT |
| 9.98 | 2.24 |

| Sr. No. | MAJOR LIVESTOCK | INDIA | GUJARAT | CENTRAL GUJARAT |
|------------|--------------------|--------|---------|--------------------|
| 1 | Cattle | 190.90 | 9.98 | 2.24 |
| 2 | Buffaloes | 108.70 | 10.38 | 2.67 |
| 3 | Sheep | 65.07 | 1.71 | 0.12 |
| 4 | Goat | 135.17 | 4.96 | 1.61 |
| 5 | Pig | 10.29 | 1.79 | 0.42 |
| 6 | Others | 2.56 | 0.64 | 0.01 |
| Total | | 512.69 | 28.86 | 7.07 |

Food Processing

The agricultural and the industrial development of Gujarat are taking place at a faster rate not only due to the keen interest of the State Government but also, due to the progressive and enterprising nature of the people of the State. Agro Industrial Sector has been one of the identified thrust areas in the successive State Industrial Policies.

In Gujarat, at present there are over 600 cotton ginning and pressing factories, 900 oil mills, 45 solvent extraction plants, 1500 rice mills, 48 flour mills, 18 sugar factories, 51 fruit processing units, 200 cold storages, 53 cattle feed factories, 256 bakery units, 65 fast-food manufacturers, 53 spices processing units, 18 sea food processing units, 45 milk processing plants, 12 dehydration plants, 9 paper board factories, 2 starch and 1 yeast making factory. Gujarat has currently over 16,400 small enterprises in food processing, beverage and tobacco processing and about 30,000 food processing units which employ over a million people in the State.

The industrial horizon has started widening and processing of agricultural produce will assume a major proportion. There is great scope of improving the efficiency and output of the existing food processing industries.

Fishery

Gujarat is the highest contributor of nation's marine exports both in terms of quantity as well as value, although the state has traditionally been a vegetarian state. It is ranked second in marine fish production and inland water resources were brought under culture fishery in the eighties. This business has become lucrative over the years due to increase in demand for fish from nearby cities. Smart entrepreneurs have devised ways to tackle problems like poaching and resistance from villagers. The village ponds in central Gujarat at Anand and Kheda Districts are brought under fishery culture over the last few decades. The pond size varies from 0.5 ha to 15 ha, and water is available till the end of March. Most of these ponds are canal fed. This gives 6 months for the fish farmers to harvest their catch when fingerlings are used as seed. There are many farmers' ponds in the villages of Anand and Kheda Districts. The Regional Research Centre of ICAR- CIFA, Bhubaneswar has been operational at Anand Agricultural University. The progressive fish farmers of Anand and Kheda Districts are being provided with complete technical support of nursery raising of the improved variety of rohu seed i.e. Jayanti rohu (Spawn) procured from ICAR-CIFA, Bhubaneswar.

MAJOR ISSUES

The major part of the central Gujarat region falls under semi-arid and humid types which has been divided into two Agro-climatic zones. One is Middle Gujarat Agro Climatic Zone and another Bhal & Coastal Agro Climatic Zone. The major issues concerned to agriculture in the region are as follows.

- Fragmented small land holdings
- Declining water table
- Depleting soil fertility resulting in low productivity
- Soils low in organic carbon due to lesser use of organic matter/manure
- Soil salinity and alkalinity problems due to canal flood irrigation and use of brackish water for irrigation
- Inadequate availability of high yielding varieties and quality seeds
- Stagnation in yields



- Non-judicious and improper usage of chemicals, pesticides and fertilizers hazardous to soil and human health, leading to water pollution
- Rising problems of insect-pest and disease complex
- Poor post-harvest infrastructure
- Low productivity and poor management in large and small milch animals
- Unavailability of labour due to their migration in urban area
- Rising costs of labour, inputs (seed, fertilizer, pesticides, etc.) and low economic returns
- Crop damage by wild animals like Neel Gay, Pig etc.
- Inadequate Marketing facility for getting higher price of the crop due to lack of economic base and marketing awareness
- Difficulty in obtaining funds by the farmers at affordable rate of interest due to poor rural finance and credit facilities especially for small/ marginal uneducated farmers.

PIONEERING BASE FOR AGRICULTURAL EDUCATION AND RESEARCH

In central region of Gujarat State, the agricultural education was started way back in 1938 through establishment of *Krushi-Go-Vidya Bhavan* at Anand, the milk city of India. This Institute established through pioneering efforts of Sardar Patel and Dr. K. M. Munshi and ably nurtured by Dr. M. D. Patel was popularly known as *Khetiwadi* or the Institute of Agriculture. Later on in 1947, with the establishment of B. A. College of Agriculture, which was initially affiliated to Bombay University until

1956 then to Gujarat University until 1962 and subsequently to Sardar Patel University became integral institution of Gujarat Agricultural University in 1972 along with Sheth M.C. College of Dairy Science and the Government College of Veterinary Science and Animal Husbandry, Anand.

Anand Agricultural University came in to existence with effect from May 01, 2004 with transfer of the activities of the Anand zone of the erstwhile Gujarat Agricultural University. It has now 10 constituent colleges, including three colleges for Agriculture, and



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one each for Veterinary Science and Animal Husbandry, Dairy Science, Agricultural Information Technology, Food Processing Technology and Bio Energy, Agricultural Engineering, Horticulture and Agricultural Business Management Studies. It also has 25 on campus and 23 off-campus research centres, 1 Extension Education Institute and 22 Extension Education centres. The districts of Ahmedabad, Anand, Botad, Chhotaudepur, Dahod, Kheda, Mahisagar, Panchmahal and Vadodara are covered under territorial jurisdiction of the university comprising nearly 17.41 % (3.413 million ha) area of Gujarat State (19.60 million ha).

AAU and its progenitor Gujarat Agricultural University, always have/ had dominant presence in Indian agricultural education system, ever since 1972. Prime institutions/colleges like B. A. College of Agriculture, Sheth M. C. College of Dairy Science and College of Veterinary Science & A.H. had their reputed presence even from 1947, 1961 and 1964 respectively to undertake useful interventions related to agricultural education and research, which later contributed significantly in paving a path for many revolutions (green revolution, white revolution and many other historic agricultural innovations). These historic institutions continue to remain prime faculties of present days AAU, which along with the subsequently added new faculties and colleges have gained increasing importance as well as higher status across the nation even though the AAU has just entered into its second decade of age.



- Inevitable need to focus on Agriculture for socio-economic development
- Advantage Gujarat Growth Engine for the country
- Favourable soil, water, climatic conditions of Central Gujarat along with prosperity
- Increasing popularity of Horticulture crops
- Well established Animal Husbandry with advantage of Amul pattern of dairying
- Potential to address the problematic issues by converting them into Opportunities
- Strong foundation for Agricultural education and research
- Increasing visibility of AAU through its success stories

AAU

AAU - CURRENT STATUS

Anand Agricultural University (AAU) was carved out of Gujarat Agricultural University (GAU) on 1st May 2004 by Act No 5 of the Government of Gujarat. At present, its jurisdiction includes 9 districts of central Gujarat. The university has rich heritage as the rot was sawn in the form of the then Institute of Agriculture in 1938 established through the efforts of Sardar Vallabhbhai Patel and Dr. K. M. Munshi. On inception of AAU, three collegesone each in Agriculture, Dairy and Veterinary Sciences; 16 research stations and equal number of extension education centers including two KVKs were transferred from GAU to AAU. In last 13 years, AAU has grown by leaps and bounds and at present has 8 faculties, 25 research stations at main campus and 23 research stations at off campus locations. The University has made tremendous progress in all its mandated areas of education, research and extension education.

The Organization and Governance structure of AAU assures the integrity and quality of its academics and is invigorating for the success of the Institution. The Board of Management remains the supreme governing authority at the University level, while the Academic Council is responsible for the maintenance of standards for teaching and examination process by the University. Faculties and Board of Studies of different group of subjects take care of curricula and quality of course syllabi for various subjects. All the research activities are monitored by AGRESCO committees and Research Council, while the Extension activities are monitored by Extension Education Council. AAU at present has an annual budget (Plan, Non-plan, ICAR, Other agencies) of about Rs. 227 crores.





Decision making channels of AAU



Organizational Set-up

Vision 2050



Vision 2050

Among majority of the agricultural universities in the nation, AAU has higher strengths in terms of number of colleges, faculties, disciplines, labs, research centers/units, R & D projects, physical infrastructure, professional collaborations, industrial inter linkages, farmer centric extension activities and many other innovative/specific expert facilities. AAU at present comprises eight faculties, 4200 students, 468 technical staff, 10 colleges, 48 (25 on campus & 23 off campus) research stations/ centres/sub-centres, 5 polytechnics, 2274 acres (920 ha) land [709 acres (287 ha) at main campus, 1565 acres (633 ha) off campus]. Total 596 posts in teaching and research (3 Directors, 6 Principals, 2 Associate Directors, 60 Professors & their equivalent, 171 Associate Professors and 354 Assistant Professors and their equivalent) have been sanctioned. AAU has in all 1268 members of non-teaching and supporting staff.

Education

Anand Agricultural University (AAU) is committed to develop competent human resource to serve the society in general and farmers and food industry in particular for sustainable livelihood, efficient use of natural resources, ensuring food security and safety for the nation. The AAU believes in harnessing the power of science and innovation for increasing the prosperity of the society. Our Emblem symbolizes our commitment to make our country abundant in agriculture and pay tribute to our mother land and our pledge to make country prosperous. Our Motto is *"Krunvanto Rastram Krushi Sampannam"* which means that we, the scientists, students and all the employees of AAU unitedly stand to make the solemn pledge that we enrich and glorify the grandeur of our country and make it agriculturally prosperous.





Anand Agricultural University is known not only in India but abroad for the quality of its education and thus its students and alumni. Colleges of Agriculture, Dairy and Veterinary are oldest colleges of repute of the University. Following is the list of colleges and programs offered by different colleges under AAU.

| Sr. | Name of College | Degree | Duration | Total Intake | Year of |
|-----|--|-----------------------------|----------|--------------|---------------|
| No. | | | (years) | capacity* | Establishment |
| 1 | B. A. College of Agriculture, | B.Sc. (Agri) | 4 | 133 | |
| | Anand | M.Sc. | 2 | 94 | 1947 |
| | | Ph.D. | 3 | 43 | |
| 2 | College of Agriculture, Vaso | B.Sc. (Agri) | 4 | 55 | 2012 |
| 3 | College of Agriculture, Jabugam | B.Sc.(Agri) | 4 | 40 | 2013 |
| 4 | Sheth M. C. College of Dairy | B.Tech. (DT) | 4 | 65 | |
| | Science, Anand | M.Tech. | 2 | 21 | 1961 |
| | | Ph.D. | 3 | 08 | |
| 5 | College of Veterinary Science | B.V.Sc. & A. H. | 5.5 | 82 | |
| | & Animal Husbandry, Anand | M.V.Sc. | 2 | 61 | 1964 |
| | | Ph.D. | 3 | 25 | |
| 6 | College of Food Processing | B.Tech. (FT) | 4 | 40 | |
| | Technology & Bio-energy, | M.Tech. | 2 | 11 | 2009 |
| | Allallu | Ph.D. | 3 | 03 | |
| 7 | Institute of International Agri- business Management, Anand | MBA (ABM) | 2 | 30 | 2008 |
| 8 | College of Agricultural Engineering & Technology, | B.Tech. (Agril. Engg.) | 4 | 40 | 2000 |
| | Godhra | M.Tech. | 2 | 10 | 2008 |
| | | Ph.D. | 3 | 04 | |
| 9 | College of Agricultural | B.Tech. (AIT) | 4 | 40 | |
| | Information Technology, Anand | M.Tech. | 2 | 06 | 2009 |
| 10 | College of Horticulture, Anand | B.Sc. (Horti) | 4 | 55 | |
| | | M.Sc. | 2 | 12 | 2012 |
| | | Ph.D. | 3 | 02 | |
| 11 | Institute of Distance Education, Anand | M.Sc. (Agri. Journalism) | 2 | 05 | |
| | | M.Sc. (Agri. Marketing) | 2 | 03 | 2013 |

* Intake for Master's and Ph. D. Programmes may vary yearwise.



Polytechnic courses

| Sr. No. | Name of polytechnic | Diploma offered | Intake Capacity | Year of Establishment |
|------------|--|---------------------------------|--------------------|--------------------------|
| 1 | Polytechnic in Agriculture, Anand | Diploma (Agri) | 35 | 2008 |
| 2 | Polytechnic in Agriculture, Vaso | Diploma (Agri) | 35 | 2008 |
| 3 | Polytechnic in Agricultural Engineering, Dahod | Diploma (Agri. Engg.) | 35 | 2008 |
| 4 | Polytechnic in Food Science & Home Economics, Anand | Diploma (Nutrition & Dietetics) | 35 | 2008 |
| 5 | Polytechnic in Horticulture, Vadodara | Diploma (Horti) | 35 | 2009 |

During the last convocation held on 6th January 2017, AAU conferred degree to 399 graduates, 151 masters and 35 doctorate students. All the colleges have excellent placement cells and most of the students get job through campus placement cell. A few students opt for higher studies abroad as well as other parts of India. The performances of AAU students in competitive examinations taken by ICAR, UGC and other agencies have remained very good since several years.

Research

Anand Agricultural University is actively involved in research activities through 25 on- campus and 23 off-campus Research stations/ Centres/Sub-centres as shown below.

| Sr. No. | Research stations/Centres/Sub-centres | Location |
|---------------------|--|----------|
| Main (Anand) Campus | | |
| 1 | Bidi Tobacco Research Station | Anand |
| 2 | Main Forage Research Station | Anand |
| 3 | Regional Research Station | Anand |
| 4 | Main Vegetable Research Station | Anand |
| 5 | Medicinal & Aromatic Plants Research Station | Anand |
| 6 | Micronutrient Research Project | Anand |
| 7 | AICRP on Weed Management | Anand |



| 8 | AICRP on Agro meteorology | Anand |
|--|---|--------------|
| 9 | Pesticide Residue Laboratory | Anand |
| 10 | Centre of Excellence in Agricultural Biotechnology | Anand |
| 11 | Dept. of Agril. Microbiology and Biofertilizer | Anand |
| 12 | Department of Nematology | Anand |
| 13 | Centre of Organic Farming | Anand |
| 14 | Bio-control Research laboratory | Anand |
| 15 | Food Safety and Quality Testing Laboratory | Anand |
| 16 | Department of Animal Biotechnology | Anand |
| 17 | Poultry Research Station | Anand |
| 18 | Animal Nutrition Research Station | Anand |
| 19 | Reproductive Biology Research Unit | Anand |
| 20 | Livestock Research Station | Anand |
| 21 | Department of Dairy Microbiology | Anand |
| 22 | Horticultural Research Station | Anand |
| 23 | AICRP on Agricultural Ornithology | Anand |
| 24 | AICRP on Seed Technology Research | Anand |
| 25 | Department of Seed Science and Technology | Anand |
| Off – Campus Research stations/Centres/Sub-centres | | |
| 26 | Main Rice Research Station | Nawagam |
| 27 | Main Maize Research Station | Godhra |
| 28 | Agricultural Research Station | Derol |
| 29 | Agricultural Research Station for Irrigated Crops | Thasra |
| 30 | Agricultural Research Station | Vaso |
| 31 | Krishi Vigyan Kendra | Devataj |
| 32 | Pulse Research Station | Vadodara |
| 33 | Paddy Research Station | Dabhoi |
| 34 | Agricultural Research Station | Jabugam |
| 35 | Tribal Research cum Training Centre | Devgadhbaria |
| 36 | Agricultural Research Station | Dharmaj |

| 37 | Agricultural Research Station | Dahod |
|----|---|-------------|
| 38 | Kapila Gou Sansodhan Kendra | Meenawada |
| 39 | PashupalanSansodhan Kendra | RamnaMuvada |
| 40 | Agricultural Research Station | Sansoli |
| 41 | Agricultural Research Station | Nenpur |
| 42 | Agricultural Research Station | Khambholaj |
| 43 | Agricultural Research Station | Kakanpur |
| 44 | Narmada Irrigation Research Station | Khandha |
| 45 | Castor and Seed Spices Research Station | Sanand |
| 46 | Regional Cotton Research Station | Viramgam |
| 47 | Agricultural Research Station | Arnej |
| 48 | Agricultural Research Station | Dhandhuka |

Research contribution of the university since its inception has been spectacular with the release of total 63 crop varieties including eight varieties in rice; five in chilli; four in totacco, three each in maize, brinjal, tomato and sorghum (forage); two each in pigeon pea, desi cotton, dill seed, bottle gourdand guinea grass; one each in okra, garlic, onion, cucumber, muskmelon, ridge gourd, pumpkin, cowpea, green gram, pearl millet (forage), lucerne, marvel grass, napier grass, anjan grass, oat, kalmegh, safed musli, ashwagandha, senna, basil, kodomillet, soybean, duram wheat and kuvarpathu. Efforts made by scientists of the university resulted in 658 technologies, which include the aforementioned 63 new varieties and 595 recommendations for farmers besides 367 scientific recommendations.

Through ICAR sponsored Mega Seed Project, AAU produces quality seeds of various crops under the brand name of "ANUBHAV SEED". The





project has contributed to increased Seed Replacement Rate in the major crops of the state viz. paddy (19 to 38%), wheat (25 to 33%), tur (9 to 33%), mung (23 to 37%), gram (2 to 27%) and cotton (variety) (20 to 65%) during the period from 2004-05 to 2013-14.

In addition to regular State plan and non-plan schemes and 17 ICAR All India Co-ordinated Research schemes, 611 new adhoc projects were sanctioned to AAU during 2004 to 2017 from State, Central Government and private parties. AAU scientists have published about 3100 quality research papers in national and international journals and about 3450 posters and oral presentations at various conferences, symposia and seminars.

A few of the noteworthy centers with excellent facilities and output placing AAU on higher scale in research and education endeavor are as follows.

- 1. Centre of Excellence in Agricultural Biotechnology
- 2. Ohm Research Facilities for Animal Biotechnology
- 3. Plant Tissue Culture Laboratory
- 4. Biofertilizer Production Unit
- 5. NABL accredited Pesticide Residue Laboratory
- 6. NABL accredited Food Quality Testing Laboratory
- 7. Vidya Dairy
- 8. Eleven Experiential Learning Units

Extension Education

AAU is involved in multi-facet extension education activities and keeps direct contact with the farmers and other private, governmental and voluntary organizations. Some of its present programs related with extension are given below.





- 1. Certificate Courses: Baking Technology, Commercial Poultry Farming, Gardening, Landscaping and Nursery Management, Soil Testing, Input Dealers
- 2. Special Training Programs for farmers: Food Processing Technology, Organic Farming, Weed Management, Integrated Pest Management, Medicinal and Aromatic Plants, Seed Production
- 3. Training Centres for Extension Workers: Extension Education Institute (EEI), Training and Visit Training Centre
- 4. Training Centres for Farmers/ Farm Women/ Rural Youth: [SardarSmruti Kendra (SSK), KrushiVigyan Kendra (KVK- Arnej, Dahod, Devataj), Tribal Training Centre (TTC, Dahod), Tribal Research cum Training Centre (TRTC, Devgadhbaria), Tribal Farm Women Training Centre (TFWTC), Dairy Vigyan Kendra (DVK, Vejalpur), PashuVigyan Kendra (PVK, Limkheda), Transfer of Technology Centre (TOT, Godhra), Farm Technology Training Centre (FTTC, Sansoli), Training Center (TC, Jabugam), Demonstration cum Training for Inland Fish Culture (DTCIF, Devataj)
- 5. Advisory Services : Farm Advisory Services (FAS), Agricultural Technology & Information Centre (ATIC), Transfer of Technology Centre (TOT- Anand&Arnej), Centre for Communication Network (CCN), Agri Polyclinic Centre (APC, Dahod), Publication Unit
- 6. Other activities: NARP Extension Scheme (MMRS, Godhra), NARP Extension Scheme (ARS, Arnej), C- DAP, Kisan Call Centre (KCC, Ahmedabad), Seed Village Program, Krushi Mahotsav





Under the Seed Village Program, AAU produced about 1500 tons of seeds of wheat, paddy, soybean, gram, cumin and mungbeen in more than 400 villages involving about 10,000 farmers. Krushi Mahotsav is a landmark annual program of State Government being implemented through AAU.

Extension Education Institute, Anand

The Extension Education Institute, Anand caters to the extension training needs of middle level functionaries of various development departments of Western Zone States namely Gujarat, Rajasthan, Madhya Pradesh, Chhatisgarh, Maharashtra, Goa and UTs of Diu, Daman and Dadra Nagar Haveli. During last 5 years, 357 training programs were organized.

Dr. M D Patel Regional E-Library

Dr. M. D. Patel Regional e-Library is in possession of 26 Foreign and 93 Indian Journals, 75746 Bar coded Books, 820 e-books, 10876 Reports, 13602 Back Volumes, 4542 Masters and Ph.D. thesis, 132 digitized rare books, and online resources like Commodities, Indiastat.com, India Business Insight Database and J-Gate, in addition to being an integral part of CeRA Consortium (ICAR) available and accessible to users through University Web page (www.aau.in). Large collection of institutional material like Annual Reports, Krushi Mahotsav Model, Doctoral Theses, Marketing Technologies, rare books and rare photographs are accessible through Krishikosh Institutional Repository (ICAR) through egranth.ac.in. Cyberary, a hub of e-activities, is also a part of library, providing Internet services to users with 36 computers and 100 mbps internet connectivity.

Students' welfare

Students in the University are the most important entity. The strength





of the on-roll students at present in the University is 2961 comprising 1948 for under graduation, 426 for Masters, 114 for Doctorate and 473 for diploma programs. A Director of Students' welfare is monitoring and looking after students activities. Hostel facilities are provided to UG and PG students at all the campuses of the University with separate hostels for boys and girls. Apart from hostel facilities, the University maintains sports infrastructure with well-equipped sports complex.

Information Technology

Anand Agricultural University has a separate unit of Directorate of Information Technology. It caters the demand for the use of Information Technology in the field of agriculture for the State Agricultural Universities of Gujarat and also for the Department of Agriculture& Co-operation of State Government. Internet, Intranet, E-mail, CAB Database, J-Gate, Science Direct Personalizing Research, Annual Reviews, Springer Link and Consortium for e-Resources in Agriculture services at Anand Agricultural University have been provided and maintained through Local Area Network (LAN) having GSWAN and BSNL connectivity. AAU has e-library with 27 work-stations providing services of CD ROM Database (AGRIS, AGRICOLA, J-GATE, J-CCC, BIOSIS, CURRENT CONTENTS, INDIAN HARVEST, AgeCON, PROVIS, INSPIRES/WEBSPIRES, CAB Abstract), monitored online on LINUX Server with the help of 2 mbps connectivity.

Government of Gujarat selected Anand Agricultural University to establish and implement the state wide programme of 'e-Krishikiran' under which, AAU has developed a web-based application software, which generates and provides the fertilizer recommendations on the basis of soil analysis and the nutrient requirements of the crop for each field. This will prevent indiscriminate use of fertilizers and increase their efficiency. The websites for agricultural universities, Department of Agriculture, Department of Animal Husbandry, Department of Horticulture and other





Boards / Corporations engaged in agriculture have been linked with this program, which provide information regarding different schemes, statistics, working system etc.

Recognitions

AAU is ranked 62 in overall category in National Institutions Ranking Framework (NIRF) India Ranking 2017 done by Ministry of Human Resource Development, Government of India. It is ranked 40th under university category. From the State of Gujarat, only 3 institutions have been placed under top 100 positions at national level, and AAU is one of them.

Indian Council of Agricultural Research (ICAR) has accredited AAU, which indicates the higher standards of education and research maintained by the university. In 2016 ranking of agricultural universities in India by ICAR, AAU has been placed at 20th rank.

AAU has signed memorandum of understanding with reputed foreign universities viz, Lund University, Sweden; Copenhagen University, Denmark; University of Alberta, Canada; and Florida Agriculture and Mechanical University, USA. In addition, AAU has 47 other MoUs including generic MoU with ICAR institutions and specific MoUs with other universities/institutes/NGOs in Gujarat and India. Apart from national projects, AAU has handled and still operating collaborative projects funded by European Union, Swedish International Development Agency and Government of Australia for exchange of students, faculty as well as conducting high end research.



Anand Agricultural University, Anand


Recently, UGC has announced a project to promote 20 institutions form India, which has potential to come up in first 500 in world ranking. AAU is the only university from Gujarat and one of the four agricultural universities of India, which has been identified as one of the potential institution and has been invited to apply for the "Institution of Eminence".

AAU Today

- High integrity and quality through effective Organization and Governance structure
- 8 Faculties, 25 on-campus and 23 off-campus research centers/sub centers
- Generous funding from the Governments and Non-governmental organizations
- 9 colleges, 1 P.G. Institute, 1 Distance Education Institute and 5 Polytechnics
- Release of 63 new crop varieties; 595 and 367 recommendations for farmers and scientific community
- Quality "ANUBHAV" seed production and supply
- Centers of Excellence, NABL accredited laboratories
- Extension Education Institute for western India
- Enriched modern Library and effective application of ICT tools
- Green campus with vibrant students' welfare activities and facilities
- Leads with distinction: 1) 40th and 62nd NIRF 2017 Ranks in University and Over-all categories; One of the three Institutions in Gujarat under top 100 national ranking; 2) Only university from Gujarat and one of the 4 agricultural universities of India to compete for "Institute of Eminence" proposed by MHRD, GoI; 3) Accredited by ICAR.



India is an agriculture-based transforming country at preent, where agriculture does not have a major share in the GDP growth, but livelihood and poverty remain overwhelmingly rural. The Vision 2050 visualises India as a developed country with a bulging middle class having reasonably high income and more than 50 % people living in urban areas. Therefore, the agricultural strategies have to, some extent, be aligned with the future development goals.

The AAU is basically an academic organization; and therefore for retaining a sharp focus, it is important that a proper balance is maintained between education, research and extension education, which sometimes gets mixed with field extension. During the last 13 years of its existence, it has evolved into a vibrant institution. AAU is a well-established and reputed institution supported by different colleges (11), polytechnics (5), research stations/centres/sub-centres (25 on-campus and 23 off-campus) and extension centres (16) having jurisdiction over nine districts of the central Gujarat besides the modern infrastructure facility of a global institution.

AAU has passed several notable milestones and consistently improved on many fronts that have a bearing on achieving academic excellence. Successful attempts have been made to establish the university as a great center for the purpose to create the wealth of knowledge in its domain area. It has endeavored to create a highly inspiring atmosphere and learning environment in a beautiful and green campus. Apart from quality education, AAU shoulders the responsibility of agricultural research of par excellence meeting the escalating demands of food grains and animal products as well as successful transfer of technologies through a strong network of extension education imparted to the farmers. Combined efforts have escalated the decadal agricultural growth of the state.



STRENGTHS

Strong foundation

The roots of this great institution were nurtured by Sardar Patel and KanaiyalalMunshi in the year 1938 to embolden modern scientific agriculture including animal husbandry in Charotar region of middle Gujarat. By the time India got independence, the Institute of Agriculture, the progenitor



of AAU, had already made it presence felt at the national level by some

pioneering work on agricultural education, animal nutrition and animal husbandry practices. Establishment of colleges such as B.A. College of Agriculture, S.M.C. College of Dairy science and Gujarat College of Veterinary science & A.H. respectively in 1947, 1961 and 1964, along with various research centres gave the right impetus to the growth of higher agricultural



education and research. Apart from creating important human resource,

much needed immediately after the independence, the research centres like Bidi Tobacco Research Station (ICAR), Ford Foundation Project on Reproductive Biology, Regional Animal Nutrition Station etc. brought laurels. Pioneering research in Micronutrients, Agrostrology and Biological control and education in Agro-meteorology are credited to the Institute. Regional Extension



Education Institute formed a much needed bridge between the scientists



and farmers during the earlier years, thereby rejuvenating the constructive efforts to solve the actual problems of the farmers based on their feedback.

The institute with its great heritage, work culture and reputation merged with the Gujarat Agricultural University (GAU) in 1972. GAU was a multi-campus University taking care of the entire state, including the Anand campus for the middle Gujarat region. During the period of 1972 to 2004, GAU progressed with great strides adding many infrastructural facilities as well as educational and research programmes. This period marked a close liaison with the State Government and ICAR, which resulted in getting number of research projects in the fields of Agriculture, Horticulture, Veterinary science, Animal Husbandry and Dairy Science. This not only augmented the capabilities of the institution in providing holistic approach for higher agricultural education but also contributed in increasing agricultural production at the State level thereby addressing the farmers' welfare.

As a part of well thought strategy of the State Government for focusing on region specific needs and demands for agricultural research and education, AAU was carved out from the GAU for middle Gujarat region along with three other SAUs for other regions of the State. This resulted in greater autonomy for regional agriculture development, and as it had inherited such a well-developed infrastructure with vibrant activities, AAU used this strength as a force multiplier to enlarge its vision, adding momentum to its efforts in fulfilling its mandate. Established almost at the beginning of new millennium (2004), AAU began its journey with realization



Anand Agricultural University, Anand



of challenges to agriculture in 21st century, making it more committed and dedicated to contribute still better with the strong foundation and experience it had.

Nine districts of central Gujarat region fall under AAU jurisdiction viz. Ahmedabad, Anand, Botad, Chhotaudaipur, Dahod, Kheda, Mahisagar, Panchmahal and Vadodara. This area is one of the most prosperous regions of Gujarat and the progressive farmers of the area respond well in adopting the advanced technologies as suggested and provided by the University.

Infrastructure facilities

The University has by now created a world class innovatively conceived and meticulously planned infrastructure for the higher education and research in agriculture and allied sciences. Spacious and well-furnished buildings are available for offices, colleges, library, sports, health centre, hostels and departments. The colleges are well laid out with modern smart class rooms, seminar rooms, conference halls, auditoriums along with fully equipped laboratories and other students' amenities. Excellent laboratory facilities exist in the areas of Plant Biotechnology, Tissue culture, Pesticide residue analysis, Micronutrients, Soil science, Seed technology, Biocontrol, Plant Pathology, Biofertilizers, Agro-meteorology, Animal Biotechnology, Animal Genetics, Dairy Microbiology, Food Processing, Food Quality Testing, etc. The e-library facilities, information network through LAN and internet facilities are also available.

A set of well-developed experimental farms for both students practicals as well as for research are available. The farms have been appropriately equipped and mechanized with all kinds of necessary facilities for higher efficiency of the production.



Anand Agricultural University, Anand



Facility for consistent production of quality seeds and seedlings for different crops under varied categories is created to facilitate farmers in the region for raising agricultural production and productivity. There are state-of-art facilities for the production of biofertilizers, bio control agents, composite animal feed, various dairy & food products as well as other inputs for the farmers. The university also has established two NABL accredited laboratories on Food Quality Testing and Pesticide Residue analysis. Welldeveloped experiential learning units in the field of food processing, flouriculture, animal feed, dairy, tissue culture and others are available for hands-on training of the students as also for prospective entrepreneurs.

High end facilities have been established for DNA finger printing of crops and other bio-inputs. University has created nucleus concept of soil health card with its wider on-ground applications in Gujarat. Same is highly recognized and replicated by Govt of India for other states across the nation. Specific Mineral Mixture for large animals of different districts of Gujarat has been developed to improve the health, reproduction and production of the animals.

Diversified courses of studies

Anand Agricultural University is imparting quality education in agriculture and allied sciences. It is promoting real integration of teaching, research, extension, and training activities with a view to encourage the overall productivity in agricultural sector, by serving as a premier educational and research organization in Gujarat.

AAU provides high quality education at all levels including under-graduate, post-graduate and vocational courses in the field of Agriculture, Horticulture, Veterinary, Dairying, Agricultural Engineering,





Food Processing, Agricultural Information Technology, Agribusiness Management and others. Presently, the university offers Bachelor's degree in seven faculties, Masters in 51 and Doctoral courses in 45 different disciplines. Further, diploma courses in five disciplines are also being offered. AAU has by now developed quality human resource by producing 3189 graduates, 1848 masters, 287 doctorates and 483 diploma holders in agricultural and allied sciences since its inception *i.e.* 01-05-2004.

Strong research base

AAU has a good research to its credit. The university has crop specific and agro climatic based experimental farms both for students learning as well as crop research. AAU has one of its own kind of latest integrated research facility. The highly skilled and system-motivated scientific strength has evolved on the foundation of advanced research orientation and scientific temperament. This professionally driven research environment can be compared to any global university.

The University has so far developed 1025 need based technologies and 63 high yielding varieties of different crops to enable farmers to reap higher yield with better quality. Intellectual Property Right Cell (IPR Cell) is already established which is actively functioning for patenting the technologies developed. Till now, one patent has been granted and 7 patents have been published and registered for Geographical Indication (GI) of "Bhalia Wheat". Institutional Biosafety committee (IBSC) and Institutional Germplasm Identification Committee (IGIC) are functioning at the University.

AAU's activities have been expanded to span newer and frontier areas of research such as soil health card, bio-diesel, biofertilizer, bioactive compounds, bio control agents, genome sequencing in plants and



Anand Agricultural University, Anand



animals, fermented functional foods, and other areas. This is apart from the mandatory research focus on rice, maize, tobacco, vegetable crops, fruit crops, forage crops, animal breeding, nutrition and dairy and food products. The core of AAU's operating philosophy however, continues to create the partnership between the farmers and committed academics and scientific research as the basis for sustainable agricultural development in the country in general and in the region in particular.

Research planning, review and bringing out recommendations for the farmers are done in an exemplary manner through Agricultural Research Councils (once in a year, first at each university level and then at state level). Important input for prioritization of research and monitoring of the impact of recommended technology are provided by the Zonal Research and Extension Agricultural Council, which meets twice in a year i.e. for *kharif* and *rabi* seasons. The system developed over the years has a strong inbuilt analytical reviewing capability.

Agriculture related natural resources

A variety of soils are found in the region, the majority being Goradu soil (sandy to clay loam alluvial soils), which is well known for its high fertility and productivity. The varieties of soil available also provide ample opportunities to the University in taking up various research and extension programmes for the benefit of farmers and other stakeholders.

The region also has conducive climatic conditions for production of various agricultural/ horticultural crops. The region receives annual rainfall ranging between 600 to 1000 mm in 28 to 45 rainy days. The coefficient of variation varies 34 to 40 %. About 95 % of annual rainfall is received in four months period (June to September). Mean monthly





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maximum temperature reaches beyond 40 °C during May, while minimum falls below 12 °C during January.

There is a wide diversity in crop species and cropping systems that provide good scope for location specific research and focused agricultural development. Middle Gujarat is highly dominated by high value cash crops such as tobacco, cotton, banana, potato, cumin, castor, chikori etc., while maize, wheat, chickpea, paddy are the other important crops. Number of cropping systems mostly covering *kharif* and *Rabi* seasons are common in irrigated area. In waterlogged area, gram, wheat and mustard are grown on residual soil moisture in *Rabi*. In summer, forage crops, *bajra* and groundnut are cultivated.

Mixed farming system mainly with animal husbandry is adopted by most of the farmers, which provides an overall decent farm income that is insulated from the vagaries of monsoon and crop losses due to pest and diseases or such other factors. Because of dairy cooperatives in villages established as per Amul pattern, animal husbandry is a good source of income for the farmers. Sizeable populations of buffalo, cross-bred cows and poultry are found in the area.

Enterprising farming community

Vision 2050

Technologies and Package of Practices recommended by AAU are well adopted by the farmers of middle Gujarat, who show great deal of interest in modern tools of agriculture. Known for their enterprising character, they take up innovative ventures easily. Their interest in advancements of agricultural practices especially in relation to quality seeds, organic farming, drip irrigation, green house and poly-house, food processing and value addition, export trade etc. results in continuous enquiries to the University making the University sensitized to their concern and problems and thus giving better output.



Anand Agricultural University, Anand

Network of research centres

A network of both on- and off-campus research and extension centres and sub-centers spread throughout the nine districts of central Gujarat provide the opportunities for location specific research and extension activities. These centers are at Navagam for paddy; Arnej for rainfed durum wheat and gram; Godhra for maize; Vadodara for pulses; Dahod for maize, hillmillet and pulses; Viramgam for *deshi* cotton; Derol for pulses and drilled paddy; Thasra for irrigation; Dhandhuka for *deshi* cotton and rainfed durum wheat; Dabhoi for TP paddy; Khandha for irrigation and Sanand for castor, spices and *deshi* cotton. Extension centres are situated at Arnej, Dahod, Devgadhbaria, Devataj and Sansoli.

Linkages

AAU has a strong network of linkages both with local, national as well as international organizations, institutes and industries. The university has signed more than 50 MoUs with regional, national and global organizations/ institutions in the field of Research, Education and Extension activities. AAU is the only SAU in Gujarat identified as nodal institute for MSME (GoI) support to agro-entrepreneurs, have start-up incubator and student start up and innovation program as part of the entrepreneurship development.

Alumni of the university are spread all over the world holding key positions in public, private and entrepreneurship sectors.

Administrative and financial inputs

AAU has a well-defined time-tested system of administration and the governance of various activities related to education, research and extension is done as per the laid down statutes, rules and regulations as prescribed by the Act. Various statutory bodies and authorities of the University have been in operation with the members having experience and right vision.



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AAU is comfortable with the financial condition of the organization. The university is getting encouraging funding from the state and central governments including ICAR, which has added to the momentum of rapid strides towards excellence. As the state government considers the SAUs as centres of prime significance in improving the farmers' welfare, AAU gets positive consideration in allotment of non-plan and plan projects on educational and research.

OPPORTUNITIES

Under rapid changing global scenarios, key elements such as quality, competitive pricing, consumer awareness and environmental sustainability are emerging as the controlling factors for governing present day's agriculture and its development. At present, there are enormous limitations and constraints, both nature-made and man-made for the development of agriculture and agriculturists, the advent of technological developments have transformed the agriculture into a leading sector, offering enormous multifaceted opportunities to cater needs of ever growing populaces.

With a view to strengthen the growth of agriculture, the Anand Agricultural University is continuously providing higher number of quality and competent human resources (HRs), tailor-made agricultural technologies for sustainable production and post-production, solutions for efficient natural resource management (NRM), climate resilient agriculture, value addition, information technology for efficient agriculture management and agri-preneurship to the stakeholders in the most appropriate way. This is being done to raise the socio-economic status of the farmers and rural population.

As per the demand of the changing professional requirements, AAU has already conceived and is offering education in the form of advanced courses on niche areas and emerging technologies. The university is also putting equal emphasis on research in basic and fundamental science as well as applied technologies for further enhancing the knowledge and skill needed for Indian agriculture and its resource management.

AAU is addressing the opportunities by creating learning and innovating environment in the agriculture education and research as a



whole and as Centres of Excellence in certain selected domains. The main mandate will be to bring specific quality outcomes in the form of uplifting the livelihood of farmers. The prominence and competence as already exists in AAU, is going to be appropriately harnessed to apprehend a research based knowledge hub yielding skilled youths/scholars, having advanced levels of exposures as well as aptitudes like; analytical skills, written communications, verbal communications, investigating capabilities, numeracy, planning and organizing potentials, team working, information based communication and technologies, technical skills, and many other 'out of the box' academic sprouts.

To meet the challenges envisaged both in terms of research as well as development goals, highly skilled and meticulously trained human resources with vast knowledge-base which cuts across disciplines and specializations are crucial. AAU needs to enhance the intrinsic and extrinsic values of the academic programmes by evolving each specialized disciplines into full-fledged centres of excellence. The work on newer programs in education such as a few selected Post Graduate Diplomas and Masters Programme, innovations in Learning Styles and Pedagogy and advanced research in Quality Value Chain will be the need of the time.

University may also undertake starting of executive programs, wherein working personnel in the Agri industry can come back to the University to refresh their skills and learn the new concepts which have come up in the recent past. The University will encourage more girl student's enrolment in various courses by giving various monetary and non-monetary incentives

Focus is set to evolve need based skills through trainings, R&D activities and research based education of higher standards. Such innovations are proposed to be pursued and evolved by having effective integrations and involvement with agrarian industries, entrepreneurs, markets, regional needs and opportunities. AAU will be putting fast paced developments in the molecular biology technologies, next generation ICT infrastructure, set up e-agri education, established system of Technology Management and Business Promotion through BPD Units, centre of Agri-Business Management and similar others.



Looking at the present scenario in teaching, we wish to make AAU a global classroom with lectures delivered to the students from teachers and researchers around the world through video conferencing and visits, also using live models of agri fields, products etc and vice versa. The AAU teachers will teach across the border in bilateral programmes with developed and developing countries. Digitization of courses for e-learning and distance learning in Agriculture and allied sciences is already on the way. This will enhance the process of e-learning. AAU is keen on students, scientists and professors exchange programs with the Universities around the world particularly in the US and EU. This will make AAU students internationally suited to the world R&D and markets with best knowledge.

The University will start training programs for export oriented progressive farmers on good agricultural practices, global GAP certifications, testing the produce for MRLs so that the agriculture produce can sell in the international market at competitive prices. The University will also take up short term training programs on export procedures and sanitary and phyto-sanitary measures. This will make our farmers self-dependent and trained farmers can train the other farmers also. At the same time, the University scientists will encourage to devise processing technologies to make export oriented products. These technologies will be transferred to agri entrepreneurs. This will increase the foreign exchange earnings through agriculture for Gujarat state in particular and India in general.

Climate change will result in higher temperatures and more frequent droughts following unseasonal rainfall, causing a threat to crops near maturity and a rise in sea level along the coast. To face such challenges, AAU will take more intensive research on crops affected by climate change and focus would be to breed varieties including molecular approaches which can perform well at adverse temperature regimes. The University will work for starting courses on organic farming and climate resilient agriculture and encouraging the farmers to take up organic farming approaches for green agriculture as a safer option in the long run. AAU will advocate implementation of 'Contingency Plan for Weather Aberrations' for five Districts for which it has been preparing. During the *Krishimela*,



meetings and *Mahotsav* Programs, scientists will offer proactive advice to farm families on land and water use and cropping pattern under different rainfall and moisture availability based on computer simulation models.

AAU - Potential to usher in new Era

- Strong Foundation
- State-of-art Infrastructure facilities
- Diversified courses for integration and better output of agricultural education
- Strong research base; expansion to span newer and frontier areas of research
- 8 patents published and 1 patent granted; GI for Bhalia wheat
- Agriculture related natural resources with enterprising farming community
- Network of research centers for location specific research
- Network of extension centers for effective dissemination of technologies
- Linkages with state, national and international organizations/institutes and other stakeholders



AAU 2050

The reasons for achieving educative innovative transformations are the present trends in Indian agriculture where the economy too is transforming from a socialist base to agriculture market, and thus inevitably needs a new vision and structure in agricultural higher education. Accordingly, such transformation of AAU as per VISION 2050 will remain equipped to foster high quality education, scholarship and research to produce enlightened citizens with strong moral and ethical values that build a tolerant and pluralistic society rooted in the culture of India.

Vision

Agriculturally Prosperous Gujarat and India

Mission

The mission of the Anand Agricultural University is to provide teaching, research and extension education services related to Agriculture, Dairy, Veterinary and allied sciences including newer sciences like Agricultural Information Technology, Agricultural Engineering Technology, Food Processing Technology, Agricultural Business Management, Horticulture etc. and thereby develop excellent human resource and innovative technologies to serve the farming community with the motto of making Gujarat and India agriculturally prosperous.

Goals and Objectives

- Make provision to impart education and thereby develop quality human resources
- Furthering the advancement of learning through research
- Passing the knowledge gained through research to the stake holders the farmers, through extension education
- Promoting partnership and linkages with national and international institutions



Values

- Uphold integrity, ethics and quality in education, research and extension activities.
- Promote, recognize and appreciate the ideas and innovations.
- Inculcate sensitivity and responsibilities towards natural resources for the welfare of society.
- Uphold professionalism in all its dealings with the stakeholders.
- Promote participatory management and effective teamwork in all its activities and operations.

AAU endeavors to pursue academic excellence and provide leadership at national and international levels, targeting quality education, research, capacity building, consultancy and innovative outreach to benefit the diverse Gujarati, Indian and global community in the field of agriculture and allied sciences. Towards achieving these targets, following thrust areas will be explored.

THRUST AREAS

EDUCATION

Agricultural education has become more challenging as agricultural practices have become more complex and new technologies are being rapidly developed. As a result, many of the skills taught in the universities have become obsolete and many new learning methodologies need to be adopted. It is also unlikely that in future, sufficient resources will be available to build new agricultural institutes and that the current methods of teaching and learning may not be sufficient to prepare students for modern agriculture. Therefore, there is a need for a paradigm shift in education from "teaching to learning", and for expanding opportunity for learning to the large population. This can be achieved by systemic approach as given under.



- Imparting quality education to produce globally competitive human resource for agriculture sector.
- Undertake collaborative projects with reputed institutions which can offer opportunities for long-term interaction with academia and industry.
- Upgrade the technical competency of teachers and educators in diverse fields so as to facilitate multidisciplinary and holistic teaching through regular trainings.
- Extensive use of ICT in the field of education and strengthening of existing facilities.
- Activity based projects to students for identifying local agriculture/ animal husbandry /dairy /food processing related problems and seeking their solutions.
- Lay emphasis on testing the ability of students by encouraging logical and conceptual understanding of the subjects.
- Inter University exchange programmes at State, National and International levels.
- Strengthening of experiential learning and entrepreneurship/skill development through hands-on- training in agriculture and allied sciences.
- Imparting education in the newer areas of agriculture viz., environmental engineering, natural resource management, renewable energy resources, climate change, organic farming, nano-biotechnology, agro tourism, carbon trading and sustainable agriculture.
- Introduction of diploma and certificate courses in newer areas of plant molecular biology, genetic engineering, DNA fingerprinting, bioinformatics, nanotechnology and plant tissue culture in agriculture and allied fields.



- Imparting education in the newer areas of veterinary sciences viz., Wild Life Management, Pet Animal Management, Techno Economics, Onco and Neuro Surgery, Dentistry, Ophthalmology, Radiology and imaging, Nuclear Medicine, Ethno Veterinary Medicine, Developmental Anatomy and Stem Cell Studies, Immunology and Vaccinology, Metagenomics, Transcriptome and Gene expression studies, Digestive Physiology and Metabolic Disorder, Endocrinology, Immunology, Meat Science, Livestock Economics and Marketing, Market Intelligence etc.
- Imparting education in the newer areas of dairy and food sciences viz., Designer foods, Functional food ingredients, Prescription foods based on metagenomics study of the consumer, Microbial foods, Food Process Equipment Design and Food Business Management.
- Introduction of short term skill development programs.
- Introduction of Ph.D. program, Executive Diploma, Bachelors' Degree program and certificate courses in agribusiness.
- Development of high end ICT infrastructure facility for providing world class learning opportunity to the students through Network Lab and high tech computers.

RESEARCH

Agricultural research has played an important role in enabling the country to increase the agricultural production. On the other hand, growing population, ever increasing food, feed and fodder requirements, natural resource degradation, climate change, emergence of new pest and diseases, slow growth in farm income, quality consciousness leading to change in consumption patterns and new global trade regulations are diverse challenges and constraints, which demand major changes in formulating and implementing the agricultural research programmes. The emerging scenario necessitates the agricultural universities to have perspective vision which could be translated in to reality through proactive, novel and innovative research approaches using cutting edge technologies. Agricultural Universities have responsibility to make available high yielding



varieties and technologies for low input cost and high production per unit area. This can be achieved by systemic focus on following areas.

A. Agriculture and Horticulture

Crop Improvement

- Exploitation of heterosis and development of male sterility based hybrids in rice and single cross hybrids in maize.
- *Ex situ* and *In situ* conservation of germplasm and maintenance of crop biodiversity through establishment of gene bank and seed bank.
- Development of aerobic rice varieties / hybrids.
- Develop hybrid/variety for quality protein maize, sweetcorn, babycorn, popcorn and high oil corn.
- Develop high yielding, low HCN content, multi-cut and better quality with more tillering, quick regeneration capacity and high leaf stem ratio genotypes (high quality proteins) in forage crops.
- Identification and development of tobacco genotypes suitable for alternate uses such as extraction of phytochemicals for pharmaceutical/industrial use.
- Identification, development and cultivation of exotic unconventional vegetables under protected cultivation.
- Production of doubled haploids through anther/microspore culture for exploitation of hybrid vigour in maize and rice.
- Collection, conservation, evaluation and characterization of under exploited germplasm of fruit and forestry trees.

Agricultural Biotechnology

- Explore wild germplasm to introgress novel genes and traits into cultivated species for development of climate resilient crop varieties.
- Integration of conventional breeding with genome resource tools for enhancing crop yield and quality of major crops of middle Gujarat.



- Introgression of QTLs for yield increment through biotechnological interventions.
- Standardization of regeneration and genetic transformation protocols for developing genetically modified crops for economically important traits in major crops.
- Development of marker free transgenic and cisgenic plants.
- Genetic purity testing of hybrids and DNA fingerprinting of other bio inputs in agriculture and molecular characterization of new varieties/ hybrids for registration under PPVFR.
- Target induced local lesions in genome (TILLING) for gene specific mutation.
- Association mapping and characterization of genes imparting resistance against various biotic and abiotic stresses and development of mapping populations for marker assisted breeding (MAS).
- Precision breeding through extensive use of molecular markers and gene pyramiding.
- Genome sequencing and linkage mapping for allele mining for various quantitative and qualitative traits and functional genomics and proteomics.
- Use of biotechnological tools for improvement of efficacy of bio-agent and development of Bio-intensive Pest Management (BIPM) module.
- Extensive use of bio informatics tools for data analysis.

Crop Protection

- Identification and evaluation of IPM and IDM strategies incorporating effective tools for management of major pest and diseases of major crops.
- Monitoring and surveillance of emerging pest and diseases under global warming and mapping of pest and disease free areas.



- Sero-diagnosis of important plant pathogens and their races.
- Isolation and identification of new strains of Plant Growth Promoting Rhizo-bacteria (PGPRs).

Natural Resource Management

- Systematic seed production programs with participation of famers and industries.
- Effective research strategies for development of drought/cold/heat/ salinity tolerant and disease and pest resistant/tolerant varieties with higher input use efficiency.
- Application of nanotechnology for improving fertilizer and pesticide use efficiency.
- Assessing bio-safety related issues of GM crops.
- Metabolic pathway manipulation for nutritional quality enhancement in crops.
- Location specific production technologies for middle Gujarat with special emphasis on eco-system, sustainability and utility.
- Integrated Farming System approach (IFS) with different models with emphasis on innovation in plant geometry, energy and integrated crop management.
- Development of protocols for weed risk analysis so as to prevent the entry of alien weeds.
- Management of herbicide resistant weeds and development of Biocontrol of weeds.
- Study of global climate change on crop weed interaction and exploitation of biotechnological means for development of HRCs management of problematic weeds.



- Enhancing the marketability of horticultural products through organic farming, value addition, processing, MIS, fertigation, waste utilization and mechanization.
- Development and standardization of farm practices for value addition in cut flowers and ornamental foliage for better shelf life and marketing.
- Standardization of agro-techniques of different valued agro-forestry tree species.
- Management of problematic soils saline, alkaline, acidic and water logged soils of middle Gujarat in reference to their nutrient levels.
- Purification and utilization of polluted water in agriculture and assessment of its suitability for irrigation.
- Day to day forecast to the farmers of middle Gujarat for avoidance of climate risks through better use of ICT and to prepare detail contingent crop planning for different categories of anticipated weather situations and use of crop simulation models.
- Study on feasibility and economics of protected cultivation and organic vegetable farming.
- Waste management and bioremediation of industrial effluents and agrochemicals.
- Research on Methanogens and Methylotrops in rice eco-system in relation to Global Warming; Management of industrial effluent (waste) generated by rice processing mills.
- Use of algal cultures in production of bio-fuel etc.
- Research on the availability of nutritionally important micronutrients across locations in the cultivars of important seeds and other edible parts of food crops.
- Regular monitoring of food commodities for pesticide residue and heavy metal.
- Development of multi Residue Method (MRMs) of new safer molecules.



B. Veterinary Science

Animal production and Nutrition

- Use of nutrients such as by pass protein and fat supplements for increased production in ruminants.
- Research on rumen microbial manipulation for mitigation of methane emission and productivity enhancement in dairy animals.
- Ration balancing in dairy animals and its effect on methane emission.
- Use of different herbal additives as productivity enhancers in dairy animals and poultry.
- Nutritional intervention in expression of genetic potential in dairy animals.

Animal Health and Reproduction

- Establishment of Research Centres for Zoonotic diseases and for Mitigation of Climatic Stress Effect on animal and birds.
- Oocyte culture, IVF, *In vitro* growth of embryo, splitting of embryo and sexing of embryo.
- Newer approaches for semen quality parameters studies for fertility and freezability.
- Development of kit for urine based early pregnancy diagnosis in cattle and buffalo.
- Introduction of telemedicine in Veterinary medicine.
- Introduction of telepathology for disease diagnosis.
- Study and validation of useful ethnopharmaco practices.

Animal Biotechnology

• Genome sequencing and identification of genes related to resistance against different diseases of animals in livestock and poultry.



- Development of markers aided diagnostic protocols for microbial, metabolic and oncogenic diseases and characterization/identification of new vaccine candidates against such diseases.
- Development of protocols for semen sexing.
- Cloning elite dairy animals.
- Genomic selection in Indigenous cattle and buffalo breeds.
- Development of sterility vaccine for bovine male.

Poultry

- Development of immune-competent poultry lines for better liveability and increased egg production and profitability.
- Development of coloured crossbreeds for rural poultry farming.
- Conservation and genetic improvement of native chicken breeds.
- Use of molecular markers for improvement of egg production and feed efficiency through marker assisted selection.

C. Dairy Science

- Corporate dairy farming
- Development of high value ingredients from milk for health, pharma and beauty industries.
- Use of other species milk, e.g. camel, goat, sheep, donkey, etc. for specific heath and technological purposes
- Testing of quality and safety of dairy products based on molecular tools.
- Newer techniques for multiple adulterants detection and their mitigation.
- Development of composite dairy foods using plant based materials and ingredients.



- Focus on development of 'Greener Technology' for milk and milk products' processing
- Center of Excellence for probiotic and symbiotic functional foods research.

D. Food Technology & Bioenergy

- New and innovative nutrition rich foods and functional foods.
- Development of innovative package which increases keeping quality of fresh and processed foods shelf-life extension.
- Bio sensors, new additions (Natural sources) as preservative and colour.
- Traditional and ethnic food standardization.
- Development of better post-harvest technologies and designing equipments for cereals, oilseeds, pulses and horticultural crops.
- Development of technologies for effective utilization of various renewable energy resources and biomass for biofuel.
- Development of testing protocols for food quality assessment

E. Agricultural Engineering

- Management practices for efficient utilization and recycling agricultural residues using RS and GIS.
- Development of crop, site and gender specific manually operated and mechanized farm equipments.
- Development of engineering techniques to minimize effect of climate change on agriculture.

F. Agricultural Information Technology

- Smart Agricultural Practices using Information Technologies like GIS, GPS, Remote Sensing, Sensor Networks etc.
- Research and development process on biological data for Bioinformatics.



- Exploring the possibilities of Drone Technology in Agriculture
- Application of Image processing techniques in Agriculture
- Research in Statistics, Data mining for forecasting and prediction in agriculture
- Mobile Technology applications in Agriculture

EXTENSION EDUCATION

Knowledge is an increasingly significant factor of production in modern agriculture. Every activity in the agricultural supply chain involves creation, processing and communication of information. Timely access to information can add value at each step in agricultural supply chain. Many innovative initiatives in ICTs in agriculture in the public, private and nongovernment sectors are underway in India. Key issues such as feasibility, scalability, sustainability, and overall impact are being addressed. Equally important is to enable small-holders access to ICTs. Information and communication technologies (ICTs) can facilitate effective data, information and knowledge flow across the network. Communication of new research findings and technologies to the end users through different mass media such as live television programme, video and audio programmes, films, magazines, newspaper column, advertisement, agricultural fairs, farmers' day, web site, e-mail, apps etc. are integral part of extension activity. These enable transfer of a greater share of innovations to producers, which can be achieved through systematic approach as under.

- Technology assessment, refinement and transfer of technologies by improving interface with farmers
- Enhancement of operational, adaptive and generative capacity of frontline agricultural extension system to address emerging challenges.
- Capacity building for use of ICTs to provide customized knowledge, skills and solutions to stake holders through extensive use of social networking.
- Use of hi-tech devices for faster agricultural information dissemination,



formulation of effective extension strategies, socio economic and psychological trait studies in respect of hi-tech communication devices.

- Conversion of technological knowhow into actual adoption of practices by stake holders through training, demonstration and personalized visit for positive change in the behavioural components.
- Development of farmer friendly interactive learning software and development of web portal for major crops to disseminate the agricultural knowledge efficiently.
- Strengthening of public private partnership involving farmers' groups, SHGs, NGOs at village level, educating farmers in the field of agribusiness, development of remunerative marketing strategies and capacity building through training of the clients.
- Studies on gender specific resource use pattern and women health status in Middle Gujarat.
- Training of the farmers in the context of weather and climate change in agriculture.
- Establishment of disease diagnosis and farm advisory cell for farmers.
- Establishment of entrepreneurship development for farmers and professionals.
- Establishment of forum of interface between stake holders and faculty which will act as a platform to reach out each other for better realization of needs, problems and facilitation for exchange of ideas.
- Popularize distance education for effective transfer of technologies to the farming communities.

Various inclusive activities delineated above, will unquestionably allow AAU to see its vastly elevated intellectual resources brought to bear on a deeper and broader range of academic, research and civic engagements aiming to draw qualitative considerations from a vast array of prospective students, faculty and researcher from around the country and world.



STRATEGIES AND FRAMEWORK

The range of activities that are proposed under VISION 2050 will undertake activities for linking the instruction (certificate programs, vocational, distant learning, diploma, UG degree, PG degrees, Doctoral and others) with the other elements like research, capacity development (technical assistance, in-service training), innovation (exemplary service demonstration), and dissemination (publication and communication to the larger community). The real executions are proposed to be comprehensive, multidimensional, and dynamic, seeking integration of instructions and research with the application of findings and skills into setting of typical agricultural community. The applied nature of VISION 2050 will ensure that the end products i.e. the Human Resource will leave the organization after acquiring ample knowledge and confidence even towards policy development besides applications of gained knowledge to demonstrate evidence-based leadership practices, addressing key issues of global inclusion and social development.

Major strategies for attaining a high level in higher education will be kept as follows,

- Attract and retain the best academic staff and provide favourable working conditions.
- Academic freedom and an atmosphere of intellectual excitement.
- Significant measures of internal self-governance for academic community.
- Adequate funding and facilities to support the research and teaching as well as the other functions of the university.
- Entrepreneurialism and active co-operation with the social and economic environment.
- Support for individual and team autonomy to obtain external funds.



- Support for graduate employment in the shortest period of time.
- Support for transfer of research outcomes.

The following specific strategies would be adopted to accomplish the vision and the goals of Anand Agricultural University and to enhance efficiency and effectiveness of education, research and extension activities.

| Sr. No. | Goal | Approach | Performance measures | |
|-----------|---|---|---|--|
| EDUCATION | | | | |
| Agricult | ure Faculty | | | |
| 1 | Quality human resource to face upcoming challenges in agricultural development. | Intensive faculty training via national & international refresher courses/workshops International collaboration via faculty & student exchange programs Utilizing smarter ways of class room education adopting e-learning resources and virtual classes across globe International level infrastructural facilities and aids as well as laboratories for teaching students by the faculty Development of multidisciplinary courses and new courses on nanotechnology, floriculture and gardening, organic farming, climate resilient agricultural and natural calamities management in agriculture | Monitoring of trained man power through internal auditing system Skill and knowledge attained after training in teaching Improvements in availability of library and e-resource facilities for faculty & students | |



| Sr. No. | Goal | Approach | Performance measures |
|---------|---|--|---|
| 2 | Improved examination & evaluation system | Adoption of OMR based UG online examination system Application of internet in evaluation system Implementation of advance system of periodical monitoring for students programs and assessment of skill development | Students clearing national competitive examinations Speedy and accurate results |
| 3 | Development of new key disciplines integrating with social and basic sciences to have specialized multidisciplinary post graduate courses | Intensifying integration of nanotechnology, biotechnology, biochemical and microbiology based basic and operational research approaches at post gradation level Integration of bioinformatics and Genetic Engineering in related disciplines for development of improved crop varieties | Availability of qualified and specialized professionals Post graduate research outcome in terms of patents, IPRs and publications Development and release of crop varieties |
| 4 | Self- employment and entrepreneurships for students to encourage agro business at regional/ national level | Strengthening of startup programs to improve competence of UG and PG students to become entrepreneurs | Number of Alumni having agro business and have become job providers Net rise in benefits for farmers |
| 5 | Increasing intake of foreign and other states' students | Creating national and global awareness on trained faculties of specialized fields and upgraded laboratories for world class research Involvement of national and international student recruitment agencies | Increase in number of foreign and other states' students from different parts of the country and world |



| Sr. No. | Goal | Approach | Performance |
|----------|--|---|--|
| | | Creating awareness globally about reputation of the college | Increase in resource generation |
| 6 | Providing strong & relevant inputs to facilitate transfer of technologies | Releasing valid agricultural information through focused publicity campaign | End results as attained and reported by KVKs/ARMAs |
| 7 | Attracting and retaining rural and tribal youths in agricultural education | Region specific tailor made entrepreneurial developments | Sustainable income and the gainful employment in agricultural & allied sectors |
| 8 | Harnessing power of recent innovations in agricultural science streams | Refinement in agricultural research and educational constituents | Levels of overall food security, food safety, farmer's prosperity, and improvements in natural resource base of the region. Also visible levels of ethical conducts, scientific integrity, accountability and quality of policy decisions |
| Horticul | ture Faculty | | |
| 1 | Upgradation of education in Horticulture faculty | Increasing intake capacity of under graduate students Establishment of full fledged 8 departments of College of Horticulture Starting of P. G. degree in field of Floriculture, Post harvest technology and Medicinal and Aromatic plant fields | Expansion of the college and the activities with increase in competent human resources Improvement in research output through more pojects in different departments |



| Sr. No. | Goal | Approach | Performance measures |
|----------|--|--|---|
| | | Updating education system through infrastructure, faculty and using different modules in teaching New diploma/certificate courses on (a) Management of orchard (b) Management of plantation crops (c) Post harvest technology and (d) Hi- tech nursery management | Increse in intake of P.G. students for higher education Improvement in skill of students under student ready programme Enhancement in the employabiliity of rural youth |
| 2 | Improvement in examination system | Online examinations Use of IT tools in evaluating students | Speed and accuracy in examination work |
| Veterina | ry Science and A.H. Fa | aculty | |
| 1 | Up scaling the institute to international repute, destination of choice for academic and research in Veterinary and Animal Sciences | Modernization of curriculum within frame work of Veterinary Council of India Creating smart classrooms and modernizing laboratories and farms for capacity building of Graduates and Post-graduates Creating reasoning ability of students from examination point of view Establishment of collaboration with other national / international universities of repute for students and faculty exchange | Competent and qualified manpower for Veterinary, animal husbandry and dairy sector More number of students opting for own startups and becoming job creators Increase in number of students clearing JRF, SRF, NET/ ARS or other competitive examinations Increase in demand of students of this institute |



| Sr. No. | Goal | Approach | Performance |
|---------|--|---|---|
| | | | measures |
| 2 | Establishing laboratories for Livestock Health and Production centric research through cutting edge technologies | Unfolding mystery of scientific problems related to animal diseases and production Linking the institutional research capacity /strength with internationally reputed laboratories Appointing excellent scientific man power for taking up institutional research goals Maintaining and enhancing genetic resources of domestic and wild animals | Generation of quality research recommendations/ practices which can be adopted at farmers' level Generation of high impact factor research publications Attraction of reputed scientists to the institute Increase in numbers of MoAs and MoUs with internationally reputed research institutes Increase in number of patents by the Institute Recognition of the Institutional scientists by other institutes/ Governments Maintenance and improvement in biodiversity |
| 3 | Transfer of technology to increase income of livestock owners | Generation of farmers friendly / adoptable technologies Intensive training of farmers for dissemination of technologies | Increasing number of technologies adopted by the farmers |



| Sr. No. | Goal | Approach | Performance |
|-----------------------|---|---|---|
| | | Arrangements for on-farm demonstrations of newer technologies Generating scientific literature in local language for easy understanding by farmers Establishing community radio /TV and ICT applications to spread technologies | measures Improvement in Socio economic, health and hygiene status of the farmers Generation of Animal husbandry related entrepreneurs at rural level Attraction of youth towards animal husbandry and dairy sector Increase in number of farms having elite animals |
| <u>Dairy Sci</u> 1 | Producing high quality human resource as per the emerging needs of the dairy Sector | Creating facilities for virtual teaching and video conference in class rooms On line attendance and literature posting to individual e-mail accounts Online exam facilities Modernize education systems (infrastructure, faculty, generation of new teaching aids and modules in teaching) Adopt problem solving approach in curricula (improving analytical skills, increase practical learning, greater focus on adopting scientific and processes research) Starting PG diploma courses | Highly qualified graduates and post graduates More number of students clearing JRF, NET, SRF examinations More number of entrepreneurs in dairy sector Improved education and research output Competent and confident students |



| Sr. No. | Goal | Approach | Performance measures |
|---------|--|---|--|
| 2 | To achieve status of international repute in the field of dairying | Collaboration with reputed international universities Faculty exchange and training programmes for capacity building in specialized fields Intensive co-ordination of multi- disciplinary education & research Free online availability of reputed International research Journals Organizing brain storming sessions on recent and advanced happenings in field of dairy science Recruitment of well qualified faculty and supporting staff | Up-gradation of faculty resulting in superior quality research Generation of IPR Licensing of technologies |
| 3 | Creation of adequate infrastructural facilities and laboratories to address emerging challenges | Establishment of departments (Sensory evaluation, Packaging technology, Traditional Indian dairy products, New products development, Functional food, Byproducts technology, Whey processing, Dairy process biotechnology, Adulteration detection) Improving and updating laboratory and classroom facilities Establishing Pilot scale plant for the production and packaging of dairy starter cultures | Qualified and trained manpower in dairy and allied sectors Solution for indigenous starter supply to all stakeholders at industrial and household level Meet the increasing demand for functional food |



| Sr. No. | Goal | Approach | Performance measures |
|----------|---|--|--|
| | | Establishment of laboratory for pathogen testing with biosafety level II and III facility Establishment of laboratory for functional products development and shelf life testing Adoption of greener technology for dairy processing | Trained manpower for adulteration detection Minimization of waste and energy saving |
| Food Pro | cessing Technology & | & Bio-Energy Faculty | The second second |
| | quality human resource to meet changing & diversified need of the Food Processing Sector both at national and global level | Evolving curriculum through analysis of profiles/ skill sets valued by industry & recruiters Establishing & using smart class rooms with e-learning resources Increasing use of simulators, pilot plants & relatively bigger equipments for student practicals for better repeatability of the results National & International refresher courses/workshops/ trainings for faculty so as to upgrade their knowledge & skill Establishing & operating Internal Quality Evaluation Cell for systematic and structured monitoring of the academic performance | Tracking through Industry/ Alumni feedback Increase in response of industry for internship & the campus recruitment Academic auditing for the capacity building of the faculty |


| Sr. No. | Goal | Approach | Performance measures |
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| | | Strengthening National & International collaborations through faculty/ student exchanges and combined research programme Strengthening Industry linkages through frequent & structured interactions to produce industry ready graduates/ post graduates Further upgrading of laboratories with state-of-art equipment /instruments/ tutors/ working models Strengthening & Upgrading Experiential Learning Units with addition of required pilot scale processing lines Introducing & offering new academic programmes such as Food Safety Risk Assessment & Management, Food Bio-Nano Technology, Food Packaging, Post Harvest & Supply Chain Management, Integrated Courses, etc | |
| Agricult | ural Engineering & Te | chnology Faculty | |
| 1 | Strengthening of UG, PG, and Diploma Education in Agricultural Engineering | Strengthening of existing departments and creation of need based new departments/centers Establishment of centralized facilities for advanced research Strengthening of online resources and library facilities | Competent and Qualified Professionals for Agricultural Engineering |



| Sr. No. | Goal | Approach | Performance measures |
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| | | Modernization of class rooms/conference rooms with advanced ICT facilities Initiation of multi engineering disciplines Initiation of academic programs in GIS & remote sensing, natural resource management, sensor based technologies, drudgery reduction, mechanization, renewable energy technologies and agricultural processing for minimization of post harvest losses and value addition Collaboration with eminent universities/institutes of India and abroad. Association with public and private enterprises for training, placement and research activities | Skilled and specialized manpower availability Solutions to related farmer's problem through improvement in PG research output |
| Agricult | iral Information Tech | inology Faculty | |
| 1 | Innovative Teaching Learning Paradigm using Information Technology | Development of Learning Management System Computer Assisted Learning Developing & Utilizing online audio/video content as learning resource | Better performance of the students Updation of course contents Better availability of internet resources improving academic interactions |

AA

| Sr. No. | Goal | Approach | Performance |
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| | | | measures |
| Agribusi | <mark>ness Management (A</mark> | BM) Faculty | |
| 1 | Empowering potential agribusiness entrepreneurs Improving the agribusiness market scenario by producing competent human resource Making the agricultural production system more economical and profitable based on market analysis and other inputs | Creation of infrastructure facilities Development of industry oriented course curricula for Ph.D. (ABM), B.Sc. (ABM) & Executive Programme and their periodical revision Development of need based learning modules Hiring & development of skilled personnel to keep pace with changing agribusiness scenario Strengthening linkages between farmers, academia and industry Enhancement of modern management tools and techniques Establishment of Centre for Training, Research & Entrepreneurship development Enhancing strategic linkages through MoUs, faculty exchange programmes and interface with other stake holders/institutions | Well qualified professionals and entrepreneurs for agricultural industry and allied sectors Skilled human resource to serve academic & research institutes Research based solutions for agribusiness problems concerning the stake holders Use of agribusiness research, as case studies for teaching, training and development programmes |



| Sr. No. | Goal | Approach | Performance |
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| | | DESEADCH | measures |
| Agricult | | RESEARCH | |
| Crop Im | provement | | |
| 1 | Germplasm maintenance and utilization | Exploration of agricultural biodiversity and its <i>Ex situ</i> and <i>In situ</i> conservation and characterization Registration and utilization of diverse germplasm to broaden genetic base of crop plants through conventional breeding approaches and distant hybridization Identification and popularization of new forage crops like <i>Clitoria</i> and <i>Opuntia</i> Evaluation of germplasm suitable for organic farming Identification of wheat germplasm against UG99 | Number of exploration attempted Number of germplasm lines collected, conserved and registered Number of new crops introduced and popularized Number of suitable varieties identified for organic farming and resistance against UG99 |
| 2 | Evaluation of crop performance and development of varieties suitable for Climate-resilience, Heat tolerance, Photo insensitivity, Salt and drought tolerance, Protected cultivation Perennial growth habit, Processing industry and Grafting | Evaluation of available germplasm Pre-breeding with allied species Conventional breeding approaches with field experimentation GxE interaction & stability analysis | Number of elite lines identified and developed for specific traits as per the set goal coupled with improved yield |



| Sr. No. | Goal | Approach | Performance |
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| 3 | Genetic enhancement through hybridization | Development of high yielding hybrids through Exploitation of diverse sources for male sterility Production of doubled haploids Fixation of heterosis via apomixes Identification of stable pistillate line in castor Development and popularization of single cross hybrids particularly in maize, Napier grass, Guniea | Number of new and novel hybrids developed for targeted traits through each approach |
| 4 | Breeding for yield and quality improvement | Development of high yielding biotic and abiotic stress tolerant/ resistant genotypes in rice, maize, pearl millet, chilli, brinjal, tomato, potato, okra, cowpea, cucurbits, isabgol Aflatoxin resistance in groundnut, YVMV resistance in mung bean / urd bean / cow pea, wilt and sterility mosaic disease (SMD) and pod borer resistance in pigeon pea Fiber quality in desi cotton High density plantations and mechanical harvesting in castor and desi cotton Breeding varieties with high nutritive value with improved grain quality | Number of high yielding varieties developed for biotic and abiotic stress tolerance/ resistance in different crops The varieties developed with desirable traits such as improved staple length, improved nutritional quality traits, increased shelf life, better processing characteristics and better plant architecture The number of varieties developed in respective crops for desirable traits |



| Sr. No. | Goal | Approach | Performance |
|---------|---|---|---------------------------------------|
| | | Developing high yielding varieties with high secondary metabolite content and aromatic oil in major medicinal crops like senna, basil and palm rosa. Use of M & AP as botanical pesticides Low ricin high ricinolic acid lines in castor Breeding for confectionary, processing purpose and improvement in oil quality ratio (saturated:unsaturated) in groundnut Breeding varieties suitable for Inter cropping and dual purpose in pigeon pea / soybean | |
| 5 | Up scaling seed enhancement into designer seed treatment technologies | Providing seed-security through public- private partnership | Healthy and uniform seed availability |
| 6 | Seed viability enhancement through advanced priming and pelleting technologies for low volume and high value seeds and high volume low value seeds | Development of seed priming and pelleting protocols for different crops | Higher production and productivity |



| Sr. No. | Goal | Approach | Performance measures |
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| 7 | Conservation of biodiversity | Establishing gene bank for conservation of biodiversity and Seed bank for multiplication of improved varieties | Biodiversity conservation and availability of improved seeds for cultivation |
| 8 | To enhance the strength of seed priming technology | Use of nano technological interventions | Increased production and productivity |
| 9 | Human resource development for seed production | Conduct short term and long term trainings | Technology transfer for quality seed production |
| Plant Bio | otechnology | | |
| 1 | Precision breeding through molecular markers | Genetic diversity analysis and identification of markers for specific traits suitable for marker assisted selection Development of mapping population, linkage maps and QTLs Introgression and gene pyramiding | Number of markers and QTLs identified Number of mapping population developed & QTLs mapped Number of gene introgressed and pyramided lines developed |
| 2 | Allele mining for biotic, abiotic stress tolerance and quality traits in crops | Transcriptome analysis, Comparative genomics, eco- TILLING, genome sequencing and functional genomic approaches with bioinformatics tools | Number of alleles identified for desired traits and their mobilization in crop varieties |
| 3 | Creation of novel genetic variation and enhancement of crop plants through biotechnological interventions | Development of doubled haploids and homozygous lines Use of rDNA technology for genetic transformation | Number of crops in which doubled haploids developed Number of transgenic events developed |



| Sr. No. | Goal | Approach | Performance measures |
|---------|---|--|---|
| | | Use of novel approaches like: Target Induced Local Lesions in Genome (TILLING), Gene & Genome editing, RNA interference and Gene silencing Genomics, proteomics and metabolomics approaches for biofortification and elucidation of biochemical pathways | Number of novel genetic traits developed. Number of biochemical pathways worked out and manipulated |
| 4 | DNA fingerprinting and development of database | Assessment of genetic variability in crop plants DNA fingerprinting of varieties and germplasm lines maintained by university and development of data base Genetic purity testing of hybrids and other bio-inputs in agriculture Transgenic detection to differentiate transgenic plants from their non-transgenic counterparts. Bio-safety testing for transgenic crops | Number of varieties and hybrids DNA fingerprinted, tested for protection of farmers, breeders and institutional rights Number of varieties/hybrids tested for the purpose Number of experiments conducted on biosafety aspect |
| 5 | Use of plant tissue culture technology for fast multiplication of dioecious crops, endangered plant species, haploid production. | • Micropropagation, anther culture, <i>In vitro</i> mutagenesis, embryo rescue, meristem culture etc. | Number of protocols standardized and commercialized, number of somaclonal variants and |

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| Sr. No. | Goal | Approach | Performance measures |
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| | somaclonal variation, distant hybridization, disease elimination, enhanced secondary metabolite production and breaking seed dormany | | distant hybrids developed |
| 6 | Modernization and strengthening of academic facilities for imparting quality education and developing human resource in frontier areas of Agril. Biotechnology | Updating infrastructure facility Providing skill oriented hands on training to the students Competence and research capability enhancement of faculty in emerging subjects areas Develop linkages with Government and Non- Governmental Organizations for collaborative research | High end Infrastructure created Number of students and faculty trained Impact assessment on the quality of education & research Number of MoUs signed and implemented |
| Plant Pr | otection | и <u> </u> | |
| 1 | Management of various insect pests by using bio- control agents | Investigation on role of bio- control agents for various insect pests Testing of promising microorganisms against different insect pests Establishment of various bio- agents in different locality | Production and development of easy production procedure of bio- control agents Production of agriculture commodities free from pesticide residue and enhance the export |



| Sr. No. | Goal | Approach | Performance |
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| | | | Reduction in environment, soil and water contamination from pesticides |
| 2 | Integrated Pest Management (IPM) | Development of IPM strategies for various insect pests Inclusion of non- chemical components in IPM programme Estimation of pesticide residues in final agricultural products Development of IPM modules for newly introduced pest | Effective and economic management of the pest Reduction in plant protection cost Reduction in pesticide residues and thereby reduction in human health hazards Effective control of new insect pests |
| 3 | Effective management of stored grain pests | Management of stored grain pests through various nonchemical, physical ecofriendly strategies | Easy and effective management of stored grain pests |
| 4 | Population dynamics of major insect pests | Investigation of peak and higher activity periods and key mortality factors for major insect pests | Selection of proper time and insecticides for the effective management of insect pests |
| 5 | Status and future impact/prospects of the crop diseases | Survey and surveillance of the diseases of crops caused by fungi, bacteria, viruses, nematodes, phytoplasma, etc Serodiagnosis, molecular characterization and identification of pathogens and their race infecting different crops | Disease free area maps Identified emerging disease problem |



| Sr. No. | Goal | Approach | Performance |
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| | | Assessment of losses and epidemiology of the important diseases and development of prediction model for disease forecasting | Agro advisory for the farmers for better management of the diseases |
| 6 | Biocontrol of diseases of crops | Identification of effective biocontrol agents for disease management Screening and testing the performance of bioagents Standardization of quality production of bioagents | Production and distribution of effective bioagents to the farmers Reduction of chemical pollution in environment and health hazard Improvement of quality of agricultural produce |
| 7 | Integrated disease management (IDM) strategies | Screening of germplasm and identification of resistant genotypes Evaluation of new molecules at their effective dose for disease management Quantification of fungicide residue in commodities. Development of IDM practices/ module for disease management Developing disease management strategies under protected cultivation | Utilization of resistant genotypes for developing high yielding resistant cultivar Recommendation to the farmers with an approach of GAP Reduction of pesticide residue in agriculture commodities to boost the export |



| Sr. No. | Goal | Approach | Performance |
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| 8 | Mushroom | Collection and conservation | Eco-friendly and sustainable disease management Management of the diseases under protected cultivation Identification |
| | Cultivation | concertion and conservation of mushroom biodiversity as bioresource for food, feed, medicine and novel compounds Development of Spawn production technology. Recycling of crop residues through mushroom production and use spent mushroom substrate as manure and animal feed. Association of SHG and NGO'S for transfer of mushroom production technology, commercialization and use | Identification of suitable mushroom with good nutritive values and organoleptic tastes Mass production of Spawn of various mushrooms Identification of suitable substrate and recycling of crop residues Popularization of mushroom cultivation thereby elevation of poverty and reduction of malnutrition |
| Natural I | Resource Managemer | ıt | |
| 1 | Increasing water use efficiency through adoption of micro irrigation system | Use of remote sensing, GIS and GPS for nutrient and water management i.e. site specific management | Increased utilization of micro irrigation system |



| Sr. No. | Goal | Approach | Performance |
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| 2 | Developing low cost technologies for <i>in situ</i> moisture conservation | Contour furrowing/bunding practices on mild slop In situ water conservation practices (i.e. tillage practices, small basins, pits, bunds) Introduced strip cropping system Tide ridge furrow method Use of organic mulch for soil moisture conservation | Water productivity increase due to efficient conservation of rain water and ultimate improvement in quantity and quality of farm produce |
| 3 | Integrated farming system for sustainable income to small and marginal farmers | Development of farming system according to need base of respective area Effective recycling of farm organic waste Increasing input and output efficiency | Reduction in risk factor against natural calamities and sustainable income Environmental protection |
| 4 | Integrated weed management | Integration of various weed management methods and biotechnology i.e. HRC in crops | Reduction in yield losses caused by weed problems and along with chemical load in soil |
| 5 | Technology for improvement/ restoration of soil health and productivity | Use of integrated nutrient management Real time nitrogen management for different crops and cropping systems in different soils Monitoring soil fertility and preparation of fertility map for better utilization of sources | Improved soil health and productivity |
| 6 | Management of problematic soils in region | Use of suitable amendments and organic waste/ farm waste materials for saline, sodic and saline-sodic soils for better production | Improved productivity of problematic soils |



| Sr. No. | Goal | Approach | Performance measures |
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| 7 | Technology for use of poor quality irrigation water | Quality analysis and survey of tube well and available waste water Development of advance techniques for use of poor quality water in agriculture Assessment of recharged ground water quality | Resource utilization and improved utilization of poor quality water |
| 8 | Management and use of municipal waste in agriculture and soil pollution control | Comparative pollutant reduction efficiency of various bio-remediation/phyto- remediation measures Determination of baseline concentration of heavy metals in different soils Mitigation of residues and toxic metabolites of agrochemical to preserve soil health | Reduction in soil and water pollution |
| Organic | farming | | |
| 1 | Nutrient management through use of farm waste | Quantification and quality study of different farm waste viz; agricultural and animal waste and their standardization through different methods Efficient use of different oil cakes Farm residue management | Improvement in soil health and sustainable crop production Improvement in carbon sequestration on long run |
| 2 | Nutrient management through testing of microbial strains | Development of user friendly and efficient strains for N-fixing and P-solubilizing microbes Development of efficient strains of K and S-solubilizing and quick decomposing microbes | Quick and effective decomposing of farm waste |



| Sr. No. | Goal | Approach | Performance measures |
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| 3 | Weed management | Use of non-chemical and preventive methods of weed management and testing their effectiveness through Crop husbandry practices like inter and mix cropping Crop rotation Stale bed technique Mechanical methods Soil solarization Biological weed control Use of myco herbicide Use of organic mulch | Reduction in chemical residue problems in organic farming |
| 4 | Pest management | Use of non-chemical, biological and cultural measures for pest management | Solve pesticide residue problem in organic farming |
| 5 | Certification: Quality standardization | Standardization of quality of organically raised farm produce | Quality evaluation of inputs and organic products |
| Horticul | ture | | |
| 1 | Establishment of organic farming technology for horticultural crops | Research in organic cultivation practices for different horticultural crops | Increase area of horticultural crops under organic farming |
| 2 | Utilizing hi-tech technology for horticultural crops | Standardization of high density plantation and canopy management for fruit crops Utilization of net house and green house for quality production of vegetable crops Utilization of protected cultivation for plant propagation (planting material) in fruit crops | Increase the adoptability of high tech technology such as HDP, PGR, mulching, fertigation, pruning techniques for horticultural crops |



| Sr. No. | Goal | Approach | Performance measures |
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| | | Utilization of PGR, mulching, fertigation, pruning/pinching techniques in horticultural crops Research for high value flower crops under protected cultivation | |
| 3 | Efficient utilization of farm and crop waste | Recycling of farm waste for utilization as a organic source of nutrients | Increased use of farm and crop waste |
| 4 | Diversification of horticultural crops | Introduction and evolution of new fruits, vegetables and flower crops and their varieties suitable for middle Gujarat | Increased area under new crops |
| 5 | Utilizing waste and problematic soil for fruit crops | Identifying the root stock of problematic and waste land for fruit crops Standardizing the technology for effective utilization of problematic and waste land for fruit and flower crops | Increased area under fruit and flower crops on problematic soil |
| 6 | Popularization of minor fruit crops | Biodiversity, conservation and evolution of minor fruit crops Standardization of production technology of minor fruit crops | Cultivated area under minor fruit crops |
| 7 | Strengthening of post harvest handling | Standardize the sorting, grading, pre-cooling, packaging, cold stage etc technology for horticultural crops | Reduce post harvest losses in horticultural crops |

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| Sr. No. | Goal | Approach | Performance |
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| | | | measures |
| Veterina | ry Science & Animal I | lusbandry | |
| 1 | Clean milk production under field condition | Screening of animals at regular interval for carrier diseases Estimation of Somatic Cell count (SCC) in milk. Development of Rapid detection test /methodology for presence of pesticide/ antibiotic residues in milk Vocational training and demonstration on clean milk production to farmers. | Milk and milk by- products will be accepted in international market. Generation of foreign revenue |
| 2 | Conservation and characterization of pack animals in modern era of mechanized transportation and enhance their value edition | Establishment of Pack Animal Research Institute (PARI) for productivity enhancement and welfare of pack animals (Camel, Horse, Donkey and Wild ass). New latest feeding technologies for pack animals to overcome nutritional deficiencies Strengthening of existing research on processing and Marketing of camel milk Marketing and value addition of camel and donkey hair By- Products. Diseases surveillance and organization of health camps on regular basis for pack animals Improvement in native breeds of pack animals through cross breeding with exotic breeds. | Improvement in health and nutritional status of pack animals Improvement in human health Biodiversity of pack animals will be maintained |



| Sr. No. | Goal | Approach | Performance |
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| | | | measures |
| 3 | Improvement in livelihood of small and marginal farmers by developing small ruminant husbandry practices | Hub for good pedigreed bucks/rams to supply breedable male animals at field level. Milk yield competitions for Milch breed goats to increase awareness and develop data base. Breeder association for different breeds of sheep and goats Bank loan facilities for sheep and goat keepers Diseases surveillance in sheep and goats and correlation with climatic parameters Authorized market yard at district level Government authorized scientific slaughter house for small ruminants at district level. Value addition of goat milk through technological interventions and marketing | Up gradation of Indian small ruminants for milk, meat, wool and fecundity Value addition of meat and milk Awareness of goat keeping will be increased |
| 4 | Generation of animal behavioral information for sustaining with environment/ climate change and its effects on various performance traits | A separate department on Animal Behavior Daily activity pattern of livestocks on livestock farms during different seasons by fixing zoom out and zoom in CCTV camera device Assess animal's behavior for different breeds under different managemental conditions | Suitable favorable alteration in housing, feeding and management will be possible to enhance productivity and profitability. |



| Sr. No. | Goal | Approach | Performance measures |
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| 5 | Establishment of | Correlate the performance of animals with their behavior under different climates and management systems Biosensor based diagnosis of | Prompt and |
| | an Apex Centre having laboratories ear-marked for research on important diseases (bacterial, viral, fungal, parasitic and metabolic) of livestock, wild animals and birds to cater the needs for western region of India | infectious/metabolic diseases Research for evolving effective preventive measures Research on developing drugs using plant material with anti-infective/ immunomodulatory activity for treatment Therapeutic applications of nanotechnology Mapping of infectious diseases Development of neutraceutical diet | accurate diagnosis based on All in one Chip Curtailing economic losses due to diseases Inexpensive treatment without the risks of drug residues, development of acquired drug resistance, withholding time for consumption of animal products Accurate delivery of drug at the desired site with better therapeutic results Increase in productivity and disease cure rate |
| 6 | Genetic improvement of indigenous breeds of cattle and buffalo | Genomic selection of sires Multiple Ovulation, Ovum Pick-up, IVF and Embryo Transfer Field Performance Recording | Improvement in breed average Reduction in non-descript cattle and buffalo |



| Sr. No. | Goal | Approach | Performance measures | |
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| | | • Creating high genetic merit sperm and embryo banks for indigenous cattle and buffalo | measures | |
| 7 | Controlling Indiscriminate breeding though elimination of scrub bulls | Development of sterility vaccine for bulls | Reduction in scrub bull population | |
| 8 | Controlling adverse effect of climate change | Development of heat tolerant strains of indigenous cattle and buffalo | Sustainable production in hot climate | |
| 9 | Mitigation of shortage in feed resource | Identification and evolution of unconventional feeds from alternate resources such as plantation crops, forest and industrial by- products | Increased availability of feeding stuffs | |
| 10 | Alleviating effects of heat stress in ruminant livestock through alterations in feeding regime | Develop package of practices through alterations in feeding regime of dairy animals, sheep and goats to alleviate the adverse effect of heat stress | Enhancement in animal productivity, reproduction and health, resulting in improved efficiency and portability of livestock enterprise | |
| 11 | Mitigation of greenhouse gas emission from ruminant livestock | Improved feeding practices (ration balancing) and use of specific agents and dietary additives | Reduction in methane emission; Improvement in efficiency of ingested energy utilizations, milk production and growth | |
| Dairy Science | | | | |
| 1 | High- technology research in neutraceuticals, value added health foods | New product developmentsEnergy efficient methodsCost control | Development of value added composite dairy products utilizing fruits and | |



| Sr. No. | Goal | Approach | Performance |
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| | | | measures |
| | | Development of technology for composite dairy products and extruded food products | vegetables, millets, cereals, oilseeds and pulses |
| 2 | Establishing 'State of the art' laboratories | Establishing sensory evaluation laboratory for conducting consumer studies and other sensory related studies for cooperative and multinational companies and conducting training in Sensory Evaluation Establishing laboratory related to ultrastructure studies of dairy foods | Efficient utilization of sensory evaluation studies for reduction in cost of product development |
| 3 | Design and Development of Indigenous Dairy Equipments | Production of traditional dairy equipments based on engineering and design principles to suit socio- economic requirements of the farmers/entrepreneurs | Improved economic returns to the dairy farmers Development of value added dairy and food products |
| 4 | Development of Renewable Energy Technologies and efficient utilization | Research on solar drying, solar water heating, advance solar collector, PV pumping Development of Advanced solar systems for cooling, test set-ups for solar, thermal and PV systems. Designing of solar thermal and PV power projects | Technology for harnessing solar energy Strengthening Green Initiative |
| 5 | Development/ modification of methods for detection of adulterants in milk and milk products | Data generation for proximate chemical composition of milk from various zones of Gujarat state will be a base to check various malpractices like adulteration | Database for reference values Improved methods |

Anand Agricultural University, Anand



| Sr. No. | Goal | Approach | Performance measures |
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| | | To explore possibilities for developing new methods for detection of the adulteration To improve promising methods for the practical application | |
| 6 | Standardization of simple methods for direct utilization of whey in dairy and food products | Exploring simple and effective methods for use of whey in dairy and food products Enhancing the nutritive values of non-dairy products by using dairy ingredients | Cost effective and affordable methods Improvement in nutrition |
| 7 | Evaluation of natural substances as food additives for improving quality and stability of dairy foods | Use of natural ingredients (such as spices, herbs, other non-conventional sources etc) to enhance the shelf life of various indigenous milk products Utilization of natural sweeteners, colors and flavors to replace their synthetic counterparts | Value added milk and milk products with health benefits |
| 8 | Strengthening the research areas on application of microbes for better dairy products | Encouraging multidisciplinary research Research based on Nano and other encapsulation technologies to deliver probiotic and nutritionally superior dairy products More focus on research works especially on extended shelf life products, and rapid detection techniques | Better collaborations, improved research standards, better outcomes Technology based solutions for industry counter part Ensure food safety and preventing food loss |



| Sr. No. | Goal | Approach | Performance |
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| 9 | Improvement of management practices throughout the dairy value chain and dissemination of best practices | Research focusing on personalized and need based food development Undertake research projects aiming at - Exploring and improving the management practices in all functional areas (viz. Marketing, Finance, Production and Operations, HR, ICT) throughout the value chain Developing linkages with all stakeholders in the value | Meeting Health conscious consumer demands No. of research projects undertaken in a variety of management areas. No. of Research papers published. |
| Es e d Dus | | chain | |
| 1 | Undertaking research to improve the effectiveness and efficiency of food processing technologies and equipment through incorporating latest innovations | Technological status of the unit operations being employed by the industry for commercial manufacturing of selected food products Refining the processing technologies for production of superior quality of products at lower costs of production Improving the operating efficiencies of the critical machines and equipments for smoother working, better output and reduced drudgery Green technology and Energy efficient methods | Improved quality of food products Lower costs of food products Increased economic returns |



| Sr. No. | Goal | Approach | Performance |
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| 2 | Under taking research in developing newer & healthier food products for the diversification of the industry and need of the consumers | New products development and process standardization | Availability of variety and nutritionally/ functionally superior food products |
| 3 | Self- employment and entrepreneurships development in the sector of food processing | Creating student start up & innovation programme through mentoring Improving entrepreneurship environment & strengthening facilities for incubating them. | Number of Alumni starting own business. Number of startups graduating to incubate. |
| Agricult | ural Engineering and | Technology | |
| 1 | Development & adaptation of solar energy, wind energy, biomass energy and biofuels technologies suitable for the region | Utilization of solar energy and wind energy to moderate the existing utilization of electrical energy Deployment of technologies for solar energy for thermal applications Usage of solar-wind hybrid system for continuous energy generation throughout the year Development and assessment of biomass gasification and biogas technologies for efficient use of bio energy Research and utilization of bio fuels technologies for energy generation | Technologies for utilization of solar wind and bio energy Extent of switching over to renewable energy from existing energy sources |



| Sr. No. | Goal | Approach | Performance |
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| 2 | | | measures |
| 2 | Reduction in cost of cultivation and drudgery by modification of the existing machines for safety precautions | Use of modern farm equipments at appropriate levels Modern technology with ergonomical and safety aspects | Increase in profit due to crop production and improvement in economical status of the cultivators, farmers etc Reduction in the accidental hazards in farms |
| 3 | Complete mechanization of farm operations from seed bed preparation to harvest and post harvest operations and automation of some farm activities | Establishment of Custom hiring centre for modern farm machineries along with R & M cell at taluka wise and crop specific region of the state Use of computer and electronics | Skill development at village level and upliftment in social status of farmers and farm labours Reduction in farm labours |
| 4 | Centre for Remote Sensing and Geo- informatics in Agriculture | Development of the laboratory for the Remote Sensing and GIS with advanced software and hardware to conduct research Assessment of the land and water resources in the region Climate change impact assessment on the water resource in the region Drought, heat waves and flood modeling using RS and GIS | The thematic maps of land, water and vegetation resources of the region Drought, heat waves and flood hazard maps Water balance of the watersheds in the region for application in optimum water resources planning and management |



| Sr. No. | Goal | Approach | Performance |
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| | | | Climate change impact maps in the region Regionalized Drought index |
| 5 | Watershed management | Watershed development and management, rainwater harvesting in different agro- climatic zones Climate change assessment Hydrological modelling | Judicious use of rain water resources. Increase in rain water use efficiency Trend analysis and adoption strategies Rainfall-runoff relationships, water balance analysis |
| 6 | On farm water management | Smart irrigation methods & tools Increasing water use efficiency Conjunctive water use Command area development and management | Sensor based irrigation scheduling More income per drop of water Enhanced overall Irrigation efficiency Innovative land use/cropping pattern |
| 7 | Development of agricultural processing technology and value addition | Development of package of practices for major crops of this region To find out prevailing status and loss assessment of various crops like maize, black gram, custard apple, turmeric, mahuda. etc. | Extended storage life of major crops Minimization of post harvest losses |



| Sr. No. | Goal | Approach | Performance measures |
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| | | Standardized agricultural technology for various crops of this region Development of low cost storage methods at farmers/ field level for baby corn and sweet corn | Rise in the standard of farmers through value added products Reduction in drudgery by developing new processing technologies |
| Agricult | ural Information Tech | inology | |
| 1 | Information Technology Enabled Agricultural Research | Research Data Management especially in applications of collaborative data use such as in models, Geographical Information System, Knowledge based systems Scientific and Technological Information Management Access to Electronic Scientific Literature Development of Software for Agricultural Research related Activities | Better Management of Research Projects/ Programmes Time line based project tracking Preventing Duplicate/ Overlapping Research Work |
| Basic sc | iences | | |
| 1 | Enhancement of Post- Harvest shelf-life of various perishable crops / fruits / vegetables (tomato, okra, banana, custard apple, mango, guava, sapota, etc.) | Analysis of Post-harvest physiology by application of chemicals /PGRs and under the MAS (Modified/ Controlled Atmospheric Storage) | Reduction in the post- harvest losses and extended shelf life |



| Sr. No. | Goal | Approach | Performance |
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| 2 | Morpho- physiological behaviour of crops | Morpho-physiological analysis under natural field conditions | Hastening regeneration processes and production of healthy plants with enhanced production |
| 3 | Evaluation of popular varieties / genotypes under abiotic stresses viz. drought, salinity, flooding etc | Morpho physiological study under stress conditions for abiotic stresses | Stable production and productivity under various environmental conditions |
| 4 | Develop C4-like C3 crops | Development of Novel cereal crops capable of C4 photosynthesis and biological nitrogen fixation | Higher biomass production |
| 5 | Development of bio-herbicides for eco-friendly management of weed | Weed dynamics studies and management in cropped and non- cropped situations | Reduction in input cost and environment safety |
| 6 | Standardization post-harvest technologies | Processing, drying and storage for different crops | Reduction in post- harvest losses |
| 7 | Nanotechnology for increasing the efficiency of agro- inputs and managing biotic stress | Novel agrochemicals | Reduction in input cost and environment safety |
| 8 | Plant-microbe interactions under abiotic and biotic stresses | Developing biotic/ abiotic stress tolerant microbial inoculations | Reduction in input cost |
| 9 | Increase in production of various vegetables and fodder through organic farming system | Growing of plants through different hydroponic and aeroponic systems | Balancing of ecosystem, soil and water conservation, organic culture |



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| Sr. No. | Goal | Approach | Performance |
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| 10 | Unravel the genetic and functional basis of component physiological traits for input use efficiency and stress tolerance | Development of climate resilient varieties / hybrids through phenomics | Availability of newer plants with potential to sustain environmental stresses |
| 11 | Characterization of released varieties and hybrids | Using morphological, bio-chemical and molecular markers | Protection of Breeders' and Farmers' right |
| 12 | Evaluation / characterization of new promising genotypes and quality enhancement | Chemotyping and Biofortification | Nutritional security, Health benefits and Socio-economic benefits. Healthy eco system and better |
| 13 | Reduction in anti nutritional factors in edible crops | | human health |
| 14 | Enhancement of secondary metabolites in Medicinal and Aromatic plants | Biochemical and physiological evaluation of germplasm and Alterations in metabolomic pathways | |
| 15 | Analysis of Medicinal & nutritional properties of underutilized plants (cactus, caparis, rayan, gunda, wood apple etc.) | Biochemical characterization | Diversification of resources for food security |
| |] | EXTENSION EDUCATION | |
| 1 | Strengthening first line extension with the support of Information Communication Technology | Two way communication with farmers through mobile application Online generation of farmer agriculture production plan and advise accordingly | Farmers friendly mobile app |

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| Sr. No. | Goal | Approach | Performance |
|---------|------|--|---|
| | | | measures |
| | | Technology transfer through Community Radio Use of advertisement in mass media like T.V., Radio and newspaper for transfer of technologies generated by the university Tapping the potential of high- tech devices and virtual learning models Establishment of separate T. V. Channel for transfer of Agricultural technology. Release of important technologies through regular columns in leading news papers Publishing agricultural technologies on University website Organization of certificate courses in Agril. Journalism and Mass media communication for agricultural graduates to provide agricultural journalist to the mass media organization to strengthen information on agriculture in media Develop DSS and expert system for transfer of technology. Develop and implement FMS/ MIS for efficient functioning | Software application for generation of streamlined advance farmer production plan with consideration of all the agricultural and socio-eco parameters. Community radio station Centre for transfer of technology through mass media Use of high tech devices for faster agricultural information Vernacular Agriculture T.V. Channel Better visibility of University technologies through tie up with newspaper agencies and updation of the website P.G. course in Agri. Journalism and mass media communication for agricultural graduates |

| Sr. No. | Goal | Approach | Performance |
|---------|---|--|--|
| | | | measures |
| | | | High-tech data center for data integration, data sharing and data management |
| 2 | Advisory support to farmers through Krishi Vigyan Kendra | Regular training to progressive farmers and need base training to identified farmers One the spot guidance to farmers through mobile scientist team as per the demand Large scale demonstration on proven technology on farmers' field Supply of inputs recommended by university for adoption of new technologies including new varieties Assessment, refinement and dissemination of technologies Demonstrate the recommended technologies as compared to local practices Effective feedback mechanism | Enhancement in the first line transfer of technology through strengthening of KVKs |
| 3 | Updation and strengthening of functionaries of different line departments in terms of agricultural technology and extension competency | Develop effective delivery systems and models for engagement with stakeholders Supply of literature on new technologies to all extension functionaries up to grass root village Coordination of NGOs for transfer of technology Regular training to extension functionaries through | Effective training in the field of agricultural technology as well extension management through Advance Training Center |



| Sr. No. | Goal | Approach | Performance |
|---------|---|---|--|
| | | | measures |
| | | scientists of the university Mobile support to extension functionaries through team of scientists for on-spot solution of farmers' problem Training programme on extension/ soft skills for extension functionaries for effective performance | |
| 4 | Updation of input dealers regarding farmers' recommendations generated by university | Supply of farmers' advisory literature to all input dealers for further transmission to farmers on use of efficient use of inputs Required training to input dealers on latest agricultural technologies | Better adoption of the University recommended technologies by the farmers. |
| 5 | Development of progressive rural youth | Vocational training programme for self-employment of rural youth Capacity building of rural youth through distance learning certificate/ diploma courses | Rapid and effective dissemination of improved technologies in remote/rural areas |
| 6 | Transfer of Technologies through Krushi Mahotsav | Organization of Krushi Mahotsav every year adopting different modules and involving scientists of the university for transfer of technologies to farmers and direct feedback by them | Effective dissemination of modern agricultural practices and technologies on a large scale at a time. |
| 7 | Advisory through Soil Health Card | Arranging soil testing of farmers' field after every season and advice accordingly through soil health card application on macro and micro elements | Soil testing through mobile soil testing lab and use of remote sensor for generation of soil health data |
| 8 | Speeding up provision of new technologies to farmers | Promoting complementary partnerships and better economic opportunities for agricultural communities/societies. | Levels of quantum jumps attained in overall agricultural productivity. |



| Sr. No. | Goal | Approach | Performance |
|---------|---|--|---|
| | | | measures |
| 9 | Empower and enrich famers by transfer of knowledge and information on every aspect of Agriculture (e-extension) | Online scientific guidance to farmers about all the crops Offering Agricultural Services in e-Governance form Mobile based applications for Farmers Market Information Services | Improvement in crop yield and Profitability Improvement in Farm Productivity |
| 10 | Demonstration of IPM strategies to farmers for major insect pests | To explain different practices of IPM module to farmers | Reduction in plant protection cost. Effective control of different insect pests Reduction of insecticides applications and safety to environment, soil and water |
| 11 | Training of IPM to | To give practical training on | By creating awareness, |
| | farmers | Integrated Pest Management | Reduction in plant |
| | | training to farmers | protection cost, effective control of different insect pests. |
| 12 | Imparting vocational training for income generation and to improve economic status of resource poor farmers/ entrepreneur | Imparting training for production of bioagents, mushroom cultivation, plant health clinic, etc | Easy accessibility of the bioagents, mushrooms and diagnosis and advisory for disease management their by generation of employment and improving socio- economic status of the resource poor farmers, entrepreneurs and public |



| Sr. No. | Goal | Approach | Performance |
|---------|--------------------|---------------------------------|------------------------------------|
| | | | measures |
| 13 | Empower and enrich | Online scientific guidance to | ◆ Improvement |
| | famers by transfer | farmers about all the crops | in Yield and |
| | of knowledge | Offering Agricultural Services | Profitability |
| | and information | in e-Governance form | Improvement in |
| | on every aspect | • Mobile based applications for | Farm Productivity |
| | of Agriculture(e- | Farmers | |
| | extension) | Market Information Services | |

AAU, thus will build upon and expand its existing relationships within organization as well as with regional, national and international organizations, offering expansion towards regular and specific teaching, research, systemic change, and policy development activities with a clear focus on supporting young students to develop innovative ideas on important issues of agriculture. Majority of VISION 2050 activities will address many sensitive issues of economic, social and climatic parameters of rural and urban India. More specifically, the University will get engaged in the development of shared curricula and learning exchanges for professionals of other organizations, thereby addressing issues related to multiple inclusions and socio-economic developments. This hiked environment will provide the students, faculty and scientists, a platform to understand the intersection of on ground knowledge, research, practice and the application of evidence-based strategies for development of agricultural sectors.



WAY FORWARD...

Vision 2050

Through this VISION 2050 document, AAU foresees an opportunity to attain further heights for becoming a leading agricultural education hub by fruitfully utilizing the prevailing high capacity and opportunities as set in the document. The proposed investments, programmes, funds and recognition will certainly create landmarks in the history of agricultural education, research and knowledge dissemination. The innovative deliverables will remain highly supportive for overall development of agriculture based sectors as well as rural societies with active penetration of global agricultural knowledge in emerging key areas considering needs at local, regional, national and global levels. Such focus on educators as well as scholars will certainly lead to offer higher advantages and benefits to end clients of agricultural sector, which includes farmers, entrepreneur, rural youth and many socio economically deprived sections of the state and the country.

In recent years, AAU has played many active roles for gaining a status of model agricultural university in western India, which in turn improved its significance at the state and national levels in contributing to accelerate agricultural growth rate. The AAU has been an active organization in terms of attracting huge grants, cooperative agreements, collaboration/consultancies, trainings, HRD, technical assistance. technological disseminations, student-teacher-farmer-industry bonds, wider employability, social sensitivity and many other measures/offers for farmers and agricultural stake holders. Looking it to be a strong agrarian mission of AAU, the inquiry and creativity is well expected as one of the core requirements to attain the bigger perceptions, beliefs and policies under the set endeavor of VISION 2050. The end goal is set to visualize a transformative view of present AAU into eminence, where our students, faculty, staff, farmers and stake holder will remain key players on a centralized elevated platform. The so achieved transformation is certainly going to revolutionize the learning environments to nurture respect for merit based education, research and knowledge sharing by accommodating



diversity, equality, adversities (climatic, social, economic, human) with meaningful ground solutions.

The key parameter that remains the sole target for the improvements/gap reduction are centered towards achieving excellence in research, world-class facilities & funding, consistent academic freedom, and an atmosphere of intellectual excitement. Existing importance of AAU and its prevailing strength will be appropriately utilized to establish the advances in agricultural and allied sciences which will create common understanding and target oriented interaction with people across the nation and globe. More relevant policy and practice solutions may get evolved to help in solving issues and concerns faced by farmers and all agricultural stakeholders/communities/cultures in a great way.

In addition to assisting challenging goal of the Gujarat and Indian Governments, the prevailing high ranked AAU under the proposed transformation, will certainly attempt to address and fulfill the need for leadership personnel, teaching, research, training, and capacity development in agricultural resources management, production, marketing, business, socio-economic uplifts and overall societal improvements. The eminent patrons will be facilitated via variety of innovative and inclusive efforts for carving conducive environment and physical settings to create and release next generation of agricultural leadership professionals and human resource of different categories to meet overall demands for modern agriculture under vastly uncertain climatic and environmental settings as well as challenging socio-economic equations.

