NINTH ANNUAL CONVOCATION

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CONVOCATION ADDRESS BY CHIEF GUEST

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Secretary,
Department of Agricultural Research and Education,
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&
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New Delhi

NAVSARI AGRICULTURAL UNIVERSITY

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Honourable Governor of Gujarat and Chancellor of Navsari Agricultural University (NAU), Dr. Shrimati Kamlaji; Hon'ble Minister of Agriculture, Govt. Of Gujarat, Shri Babubhai Bokhiriya; Honorable Vice Chancellor Dr.A.R.Pathak; Honourable Vice-Chancellors of SAUs of Gujarat; Esteemed members of the Board of Management; Learned Faculties; Illustrious Alumni, Dear Students, Representatives of Press and Media; Ladies and Gentlemen!

I feel honoured to be present amongst this illustrious gathering that represents academia, policy makers and planners, esteemed guests; faculties, students and alumni of NAU, Navsari, for the Ninth Annual Convocation of this young University. At the very outset, I convey my heartiest congratulations to all the students who have successfully completed their respective academic courses and earned degrees and awards for excellence. I also congratulate the learned faculties who worked diligently with students to impart quality education and to equip them with knowledge and necessary skills to serve the society with a human touch.

Our National Agricultural Research System (NARS), comprising mainly of ICAR Research Institutions and the Agricultural Universities, is among the largest in the world and serves as the primary centre of technology generation and

human resource development. This system has evolved over the years to keep abreast with the needs of education and science led agricultural development in the country. In this endeavour, institutional capacity building received due importance and based on the needs, new Institutions were established or the existing Institutions were reoriented to enhance systems efficiency and competence in technology development.

The efforts of scientists in developing high yielding, input efficient, disease tolerant varieties/hybrids alongwith their widespread adoption by the farmers are visible in increasing the farm productivity, quality and quantity. While the annual foodgrain production has increased from 50 Mt in 1950-51 to 259 Mt presently from a near static cultivable area of 140±2 Mha for over four decades, the horticultural production has increased from 25 Mt to about 260 Mt over the same period. Today, India is among the leading rice producers and exporters in the world. A single rice variety, Pusa Basmati 1121 has earned over Rs 18,000 crores through export last year. The active participation of ICAR in the Borlaug Global Rust Initiative (BGRI) enabled us to screen rust resistant wheat germ plasm and develop high productivity wheat variety 2967 with resistance to yellow rust, leaf and black rust including Ug99. Besides developing varieties/hybrids for enhancing production and productivity, path-breaking achievements include containment of papaya mealy bug with classical biological control which has resulted in a saving Rs 1,600 crores of crop loss. In coconut, a major plantation crop, eriophyid mite was successfully controlled through large scale demonstration of IPM packages. Enhanced production and availability of fruits and vegetables have improved farmers' income and nutritional security also.

The present milk production of over 128 Mt has resulted in per capita availability of milk of 289 grams/day and the annual egg and fish production are of the order of 66 billion and 8.7 Mt, respectively. As regards productivity enhancement, R&D efforts over the years have led to 3.6 folds increase in food grains, 1.3-2.3 folds in fruits and vegetables, 6.8 times in fish, 1.8 times in milk and 4.8 folds in eggs. Quality "seed' is a critical determinant of the farm production. In this endeavour, the Mega Seed Project of the Council has resulted in raising the breeder seed production to more than 118 thousand quintals of major crops as well as of planting material and fish fingerlings by 2012. These achievements have been notably enabled by research efforts, whose specific contribution to the output is to the extent of 13.7% in rice, 23.6% in wheat, 13.1% in maize and 8.9-11.0% in pulses and oilseeds.

ICAR study on role of R&D in reducing real cost of production of various crops during 1975 to 2005 has indicated that the most beneficial contribution of R&D to growth is through improvement in total factor productivity. This results in reducing cost of production by either enabling higher output for same bundle of inputs or same output for lower amount of inputs. The highest gain is in wheat which experienced 2.3 per cent annual decline in cost of production; similar decline was in barley, jowar, bajra and rapeseed/mustard; while rice, moong, groundnut and gram showed annual decline of around one per cent.

The Eleventh Five Year Plan (2007-12) witnessed an average annual growth of 3.6 per cent in the gross domestic product (GDP) from agriculture and allied sector against a target of 4.0 per cent. Total factor productivity (TFP) improved during the Eleventh Plan and was back to around 1980s level. The noteworthy feature is that higher growth rate in

agricultural production was brought about by improvement in productivity. Agricultural research has played a vital role in agricultural transformation and the ICAR in partnership with State Agricultural Universities have developed a number of technologies that are being used by the farmers on a large scale.

It is heartening to see that in the national agricultural scenario, Gujarat is emerging as a major player with highest contribution of about 40% ground nut, 35% cotton, 70% of the castor production and 22% of the marine fish to the national production bowl. The state has already established itself in the dairy sector having pioneered the milk cooperative movement which is adopted as a model by other states in the country. Today, the per capita availability of milk in Gujarat is more than 430g/day as against the National average of around 290 g/day. The State is the largest producer of Castor, Cumin, Fennel seeds and *Psyllium* husk in the world.

It is gratifying to know that the NAU has released 27 high yielding good quality varieties of rice, sugarcane, cotton, sorghum, moong, Indian bean, pigeon pea, finger millet, vari, turmeric and little gourd in the past and more recently, the first of its kind variety Gujarat Navsari Cotton–22, immune to jassid infestation and GN Rice-4, a bio-fortified fine grain rice variety developed through interspecific hybridization. The very fact that in last three years, a total of 60 students of various faculties have qualified ICAR –JRF, SRF, INSPIRE, MANAGE, NIAM and 31 students also qualified NET conducted by ASRB, New Delhi, bears a testimony to the high standards of education achieved by NAU.

In order to further strengthen the farm sector in the state, ICAR has established two Directorates, each specifically mandated to undertake research on Groundnut and the other on Medicinal and Aromatic plants; Regional

Stations of several Institutes; Centres of AICRPs and supports four State Agricultural Universities. The Council supports 28 Krishi Vigyan Kendras for frontline technology demonstrations to promote their assessment, refinement and transfer.

Long term trend indicates that domestic food demand is likely to rise by 1.3 per cent per year for cereals, 3.0 per cent for pulses, 3.5 per cent for edible oil, 3.3 per cent for vegetables, and 4-6 per cent for fruits and livestock products over base year 2011-12. However, the overarching concerns of nutritional and livelihood security, poverty alleviation, profitability, gender equity, ecology and environment, and competitiveness in terms of cost and quality will continue to be major issues before the NARS. Priority issues that call for attention include availability of water and its quality, soil health, genetic resource conservation, insulating farm production against increasing biotic and abiotic stresses, managing climate change, diversification, post-harvest management, enhancing input-use efficiency, energy management, increasing preparedness to match rapidly evolving trade regime, reducing knowledge lag, and congenial policy environment.

Today the problems of agriculture to meet the growing food demands are not the same what they were 2 decades ago. In the present context, issues on sustainable development of agriculture have become far more complex. Peak productivity growth rates of wheat and rice, achieved during 1980s have shown a slow down. The main causes for the decline are over exploitation of natural resource base, lack of restorer inputs and imbalanced use of key inputs including fertilizers, pesticides and water leading to environmental degradation. As a result of these, small and marginal farmers find it increasingly difficult to bear the replacement costs of lost fertility. The need of the hour is for developing a holistic

approach to attain sustainable development of agriculture through resource conservation and efficient management of resources. The small and marginal farmers whose number is growing with shrinking land holdings every passing year are hit the hardest. For them, dependence on low cost- high yielding technologies has become far more crucial.

New concerns and issues, such as gene and genetic resources, pests and pesticides, organic and inorganic, agriculture and climate change, bio-safety and transgenics, public and private goods and various forms of IPR as well as obligations under the new trade regime would require a balanced approach. In addressing varying concerns, vast potential of allele mining by deploying available scientific manpower and infrastructure be utilized to its fullest extent possible to capitalize on uncommon opportunities in a partnership mode.

Timeliness, precision and resource conservation in farm operations are of utmost importance to realise the potential yields of the technologies. In this context, gender-friendly tools for reduction in the drudgery of farm workers, improved machinery such as laser land leveller, self-propelled sprayers, precision seeders and planters, transplanters for rice and vegetable seedlings, multi-crop threshers, harvesters for cereals and sugarcane etc. have been designed and gained mass acceptance. Power availability on Indian farms increased from 1.5 kW/ha to over 1.76 kW/ha in the last decade, indicating that more and more of the agricultural operations are being mechanized. The contribution of food processing sector to Gross Domestic Product (GDP) has increased to Rs 78,094 crores in 2011-12 from Rs 52,161 crore in 2006-07 with Compound Annual Growth Rate (CAGR) of 8.0%. Development of region and commodity specific equipment and processes for post harvest loss

reduction and value addition remain our priority areas for research.

We urgently need to chalk out a sustainable path of energy development. Promotion of energy conservation and increased use of renewable energy sources are the twin planks of a sustainable energy supply. Fortunately, India is blessed with a variety of renewable energy sources, the main ones being biomass, biogas, the sun, wind, and small hydropower. Municipal and industrial wastes can also be useful sources of energy, but are basically different forms of biomass. Advantage of renewable energy are that it is perennial; available locally and does not need elaborate arrangements for transport; usually modular in nature, i.e. small-scale units and systems can be almost as economical as large-scale ones; environment-friendly; and well suited for decentralized applications and use in remote areas.

Biotechnology, both as an alternative as well as supplementary tool, offers new opportunities to increase agricultural production and productivity by using a more sustainable, stable and ecologically friendly agricultural system encompassing plants, animals and fish. Apart from increasing the production and productivity of agricultural produce and products, agro-biotechnological applications have a great potential in enhancing the value of agricultural products in terms of quality and nutrition. Biotechnology, in agriculture, is a powerful and immensely useful tool to keep pace with the ever burgeoning population for meeting the food and nutritional security, compensate for dwindling natural resource base and meeting the challenge of escalating biotic and abiotic stresses. Modern tools of biotechnology have been successfully deployed to develop genetically modified organisms (GMO) in a way that does not occur naturally through mating or natural recombination or both.

Biotechnological approaches in crop improvement programmes have started giving dividends. With totally indigenous efforts, GM potato has been developed by incorporating AmA1 gene from the pseudocereal plant, amaranth or Ramdana. The GM potato under field trial going on at your next door at Meerut has more protein than normal potato, including substantial amount of the essential amino acids, lysine and methionine. Another exciting GM crop in offing is the "Golden Rice" which is genetically engineered to produce beta-carotene, a precursor of Vitamin A. The new rice could prove effective to overcome vitamin A deficiency, a condition that afflicts millions of people, especially children and pregnant women. Similarly, major impact of biotechnology on livestock production is likely to emanate from qualitative and quantitative improvement including digestibility of feeds and forages as well as through enhanced disease protection and resistance. Use of biotechnology in livestock through low cost, effective and efficient DNA and recombinant vaccines, besides improved diagnostic tools has the potential to significantly contribute towards livestock health and production. New generation vaccines and diagnostics are being developed using biotechnological approaches. It needs no emphasis that HRD towards developing well qualified, well trained and competent human resource for the intellectual pursuits in scientific, technical and research managerial matters related to agro-biotechnological applications in agriculture is imperative.

In the past, developing countries benefited more from technological developments compared to developed countries, as the bulk of the world's agricultural science and innovation occurred in rich countries. These may not be available to developing countries in the same ways or to the same extent in future. The reasons for this are: first, recently in developed country R&D agenda have been reoriented away

from productivity gains in food staples toward other aspects of agricultural production, such as environmental effects, food quality, and the medical, energy and industrial uses of agricultural commodities. Because of this, fewer technologies generated in developed countries would be suitable for adoption in developing countries. Second, technologies that are applicable may not be as readily accessible because of increasing intellectual property protection of privately owned technologies and, enforcement of biosafety regulations. Third, those technologies that are applicable and available through spill over are likely to require substantial local development and adaptation, calling for more sophisticated and more extensive forms of scientific R&D than in the past. These new challenges call for greater self reliance in agricultural research.

Pressure of population, demand for housing, industrialization and infrastructure are taking away vast tracts of fertile agriculture land as the country lacks a sound land use plan and policy. Continuing imbalance in use of fertilizer has affected soil fertility. Groundwater in several parts of the country is going down due to over exploitation. Groundwater table is getting depleted at a faster rate in several states. It has dropped by more than four meters since 1980 in 264 districts including groundwater rich Indo-Gangetic plains.Water flow in rivers, canals and water streams is continuously declining. Management of precipitation by way of water harvesting, charging ground water, replenishing the water bodies, effective treatment of urban and industrial effluents to prevent water pollution and developing technologies to enhance water productivity through innovative models of integrated farming call for national research and development efforts.

The challenge before the country is to produce more output from less water and less land. Long run sustainability of agriculture requires that land and water are used judiciously and efficiently. The GIS-based soil fertility maps for 500 districts alongwith Decision Support Systems for efficient nutrient management, Watershed development models and Resource Conservation Technologies in Indo-Gangetic plains have improved the overall use efficiency of inputs thus optimising the cost of production. The application of research outcomes have enabled us to frame the fertilizer policy facilitating nutrient based subsidy based on the area specific requirements.

Climate change is projected to have multidimensional impact on the agricultural production environment in form of various biotic (insects, pests, diseases) and abiotic (soil, water, temperature fluctuations) stress and is recognized as a real threat to agriculture. The ICAR launched a network project, National Initiative on Climate Resilient Agriculture (NICRA), to enhance resilience of Indian agriculture to climate change and climate variability through strategic research and technology demonstration. NICRA studies have resulted in preparation of districtwise contingency crop plans. State of the art institute namely National Institute of Abiotic Stress Management, Baramati, is addressing research on abiotic stresses. Further, two institutes namely, Indian Institute of Agricultural Biotechnology, Ranchi and National Institute on Biotic Stress Management, Raipur are in the process of establishment. These initiatives are expected to strengthen Indian agriculture to face the challenges on account of climatic variability.

Increase in productivity and area, number in case of livestock, are the two sources of growth in domestic production to meet future food demand. The scope for

horizontal expansion of area available for cultivation is practically ruled out. However, there is scope for vertical expansion of area through increase in cropping intensity and per unit productivity. This can be achieved by developing cultivars that are of short duration, can be grown under moisture stress, and are tolerant to climatic conditions of lean period during which agricultural land is kept fallow. The second and more important option for raising production is to raise productivity which again critically depends upon technology that helps in: (i) raising efficiency (output per unit of land, water, energy and other sources); (ii) expanding potential to absorb productivity enhancing inputs; and (iii) reducing risk like crop failure and yield loss.

Involvement of private sector for spread of new technologies through commercialization is articulated. In this direction, AgrInnovate India Limited, a Company has been established, in Department of Agricultural Research and Education (DARE). The Company aims to promote the development and spread of ICAR technologies through IPR protection, commercialization and forging partnerships both in the country and outside for the public benefit. The main areas include Seeds; Farm Implements & Machinery; Diagnostics & Vaccines; Value Added Products; Professional Services & Turnkey Projects and Overseas Operations. Business Planning and Development units and technology incubation facilities have been established for promoting commercialization in agriculture. The efforts by ICAR through the establishment of ten business planning and development units, as an initiative under the National Agricultural Innovation Project (NAIP), have demonstrated the effectiveness of creating an institutional mechanism for formulating business policy; planning and developing models for agri-incubation and technology commercialization of

products/technologies generated from public research institutions.

The State Agricultural Universities are our major institutions of human resource development. The SAUs have played a key role in addressing the regional issues of agricultural development. I am happy to mention that in higher agricultural education, about 55% students are from rural back ground and, on an average, 36% are the girl students and their number is increasing. In a bid to enhance quality of agricultural education and human resource, strengthening of Agricultural Universities was continued through implementing schemes on modernization of library services, formation of digital library and excellence in teaching, research and consultancy. Agricultural education must evolve in tune with fast changing National and International scenario. Course curriculum for the UG and PG is revised to make the syllabi more relevant to the needs of modern education. With intent to bring about uniformity in the Acts of SAUs and its governance structure and organization, the Model Act for AUs in India is periodically revised.

The National Agricultural Policy (2000) aims for four per cent growth in Indian agriculture. This was considered vital for improving food and nutrient security as well as for inclusive growth and checking further rural-urban divide. It is widely felt and has also been documented that higher growth rates experienced by India during the last two decades or so have largely benefited urban and non agriculture population. To address the rural-urban and agriculture-non-agriculture disparities, the Eleventh Five Year Plan (2007-2012) placed high priority on agriculture and rural development and several important policy initiatives were taken. However, the actual growth rate has remained elusive and lower than the targeted growth rate. The contemporary and emerging agricultural

scenario highlights the need for agricultural R&D policy, which can guide the long-term research strategy and commensurate investments. The ICAR, for the first time, has prepared *Policy Framework for Research and Development in Agriculture and Allied Areas*. This document spells out the short and long term strategies, and underlines the key role of the public sector in governance, funding, and execution of agricultural research and education. Human resource development, partnership within and outside the NARS, including private sector and farmers, and commercialization of technology are other important dimensions of the R&D policy.

The ICAR has identified Consortia Research Platforms (CRPs), a mechanism to bring synergy and complementarity of researchers, specifically in Agro-biodiversity; Genomics; Molecular breeding; Hybrids; Bio-fortification; Nanotechnology; Diagnostics and vaccines, Conservation Agriculture; Water; Natural Fibres; Health Foods; Secondary Agriculture, Farm Mechanization; Energy; and Networks in borers, mariculture, fish health and phytochemicals. Recognizing the competency of other sister R&D Departments outside the NARS, the Council proposes research in partnership mode with organizations like CSIR, DBT, ICMR, DRDO, DST, Ministries of Environment & Forests, Space and Earth Sciences, and general Universities within the country through establishment of the Inter-Departmental Platforms for research in high priority areas such as Health Foods, Seed, Farm Mechanization and Climate Resilient Agriculture; Secondary Agriculture; Agri-processing and value addition; Capacity building in basic sciences, Remote sensing and Medium range Agro-advisory services. These platforms are intended to carry out multi-disciplinary, well planned, focused and time bound research in the respective areas. The partnership of ICAR in terms of Inter-Departmental platforms with R&D organizations is intended to be strengthened. The

core science institutions (public and private) related to disciplines concerned are integral part of the consortia platforms.

Under financial support of NAIP, all the e-Course Contents available on this website have been developed by subject matter specialist of the respective disciplines at State Agricultural Universities in India and Deemed Universities of ICAR, New Delhi. The courses material is prepared as per ICAR approved syllabus for the benefit of under-graduate students already enrolled in Indian Agricultural Universities. On-line e-courses in seven disciplines B.Sc in Agriculture, Horticulture, Veterinary & AH Fisheries, Agricultural Engineering, Dairy Technology and Home Science

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'Farmer FIRST' is contemplated to enrich farmers-scientists interface for technology development and application with the primary objective to take up technology development based on feedback with the participation of various stakeholders specially farmers. The initiative will focus on: i) Enriching Farmers–Scientists interface ii) Technology Assemblage, Application and Feedback iii) Partnership and Institution Building and iv) Content Mobilization.

Student READY (Rural Entrepreneurship and Awareness Development Yojana) programme envisaged in the 12th Plan aims at entrepreneurship development among youth. It combines both Rural Agricultural Work Experience (RAWE) and Experimental Learning courses to provide students with the grass-root level experience and entrepreneurship skills. The vast network of Agricultural Universities and Colleges can play a leading role in cultivating self-confidence and capabilities in the students required for taking up agriculture as a profession.

ARYA (Attracting and Retaining Youth in Agriculture) is another programme of ICAR proposed in the 12th Plan to build capacity of rural youth through special programmes and projects including 'learn while you earn' programme; develop a comprehensive policy for development of youth in rural areas; involve youth in policy making processes from design to implementation, monitoring and evaluation and recognise the requirements of the new-age farmers and endeavour to fulfill the same.

The ICAR has proposed a number of new initiatives in its manner of functioning, such as extramural funding for research, funds for agri-innovations and agri-incubation, and setting up of an Agriculture Technology Forecast Centre (ATFC), schemes of Adjunct Professor and Agriculture Sciences Pursuit for Inspired Research Excellence (ASPIRE), e-courses and post-doctoral fellowships.

Strong R&D is only a necessary condition for addressing needs of agriculture sector but it is not sufficient by itself. A country can benefit from R&D only if enabling institutions and policies are in place to take R&D output to the users. The mechanism in the form of extension system to disseminate R&D product developed in the lab to the ultimate users should be made effective. Greater interactions with the

Departments of DAC, DADF and other organizations for effective technology transfer and formulation of action plans through the existing mechanisms must be ensured. The second aspect is timely delivery of required inputs like quality seed and fertilizer and empowerment of farmers to purchase these inputs. The last and most important ingredient of technology led growth is efficient market and remunerative prices for farm produce. If any of these elements is missing, the benefit of R&D will not accrue or accrue only partly.

Finally, dear students, today you must introspect and find out what you were when you entered precincts of this University and what you are now? I am sure you will realise the difference that your stay at NAU has made in life. Education is not mere knowledge of any specific subject but a resource to broaden horizon of the mind. Together with academic education you have to acquire wisdom and a sense of right and wrong. You must remain ever grateful to your parents and teachers for they have immense contributions in shaping your personality. Henceforth, most of you will tread different career paths requiring you to perform different functions but you should not deviate from path of right conduct. We should remember people who have served the society, made sacrificed their life for a noble cause and try to emulate them. I would like to conclude with a quote of Mahatma Gandhi who said ***"The best way to find yourself is to lose yourself in the service of others".*** I am sure you will give your best in the years ahead and bring a good name to your *alma mater*. My best wishes to you all for a productive and successful future.

JAI HIND