CONVOCATION ADDRESS

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His Excellency Shri C. Vidyasagar Rao, Governor, Maharashtra and Chancellor, Mahatma Phule Krishi Vidyapeeth; Shri Pundurang Fundkar, Hon'ble Minister for Agriculture and Horticulture, Maharashtra and Pro-Chancellor, MPKV; Dr. K P Viswanatha, Vice Chancellor, MPKV; Dr. Dilip Pawar, Registrar, MPKV; Members of Executive Council and Academic Council; Dean and Director of Instructions; Director of Research; Director of Extension Education; Professors of the University; Invited dignitaries; Staff Members; Graduating Students and their proud parents; Friends from the Media, Ladies and Gentlemen,

I sincerely thank the Vice Chancellor for inviting me to address the august gathering on the occasion of annual convocation of the esteemed University. It is a great opportunity to share some of my thoughts with the graduating students, faculty members and all the dignitaries present here.

My dear Friends, today is the red-letter day of your life as you have achieved the basic distinction to build your future in the field of agricultural sciences. I congratulate each one of you, who are being conferred with degrees in recognition of your academic accomplishments. You should remember that you are one among those who have got the opportunity to study from this esteemed Vidyapeeth

which has nurtured your young mind with utmost care to make you comprehend the various disciplines of agriculture. The practical classes helped you to understand the hard work put by the farming community and the requirement of advanced tools and techniques for betterment of Indian agriculture. As I see you, I have no doubt in my mind that you have enormous potential and you would certainly find the ways and means to dedicate yourself for the advancement of agriculture. The qualities and trainings you have received from this great Institution would help you to face the future challenges with high confidence. You should always ask yourself a few questions to keep you updated on agriculture:

- how India has progressed over last few decades
- which are the most notable achievements which turned India from food deficient to food surplus country
- what is the present agricultural scenario
- what are the major issues faced by Indian agriculture and how to address these issues
- how you can contribute and what would be the steps you need to adopt in the coming days

Therefore, it is necessary to know about the regional and global developments which would provide you enough thoughts to make careful decisions while working for the improvement of agriculture. Discuss among your friends and teachers to arrive at meaningful solutions.

We all know that Mahatma Phule Krishi Vidyapeeth, Rahuri is a leading agricultural university in the country. The university has excelled in providing education and carrying out research activities in the frontier areas of agricultural sciences. Activities of the university spread over different agro climatic regions of Western Maharashtra. I am happy to learn that 27 research stations of the university are located in 4 agro climatic zones is engaged in advance research studies on soil, climate, cropping system, livestock and agribusiness. The results of the above studies are validated through 18 Sub-Research Stations and these stations also serve as conduit for developing of new research programmes based on feedbacks received from the farmers. The university has contributed significantly in developing advanced technologies related to irrigated and dryland farming, integrated pest and nutrient management, farm machinery and biotechnology sectors. During last four decades, the university has released more than 250 high yielding varieties of food grains and horticultural crops. In order to spread the agricultural education, the university has taken proactive initiatives through constituent and affiliated agricultural and allied colleges in Maharashtra.

Indian education system has a rich history. The residential schools called 'Gurukuls' were the traditional learning centres. At the Gurukuls, the students were taught various facets - the literature, art, philosophy, medicines, astrology, and history and so on. The famous centres of higher education at Nalanda, Takshashila, Ujjain, and Vikramshila Universities are the oldest university-system of education in the world. Over the time, Indian higher education system has undergone changes under various regimes and made considerable progress in terms of capacity building

and enrolment. In this context the role of MPKV, Rahuri must be acclaimed for offering high class agricultural graduates to the country. It is also heartening to note that MPKV, Rahuri is rated as one among the top agricultural institutions in the country.

The contribution of agriculture in Indian economy is considerable. About 60 per cent of the rural households depend on agriculture as their principal means of livelihood. Development of new technology, varietal development and cultivation practices have progressively increased agricultural productivity and widespread diffusion of these techniques has led to agricultural revolutions specifically the green revolution. It enabled food-grain production to increase from 50.8 million tonnes in the year 1950 to 200 million tonnes at the end of the century, ensuring a stable per capita availability of food grains.

Indian agriculture faces multiple challenges pertaining to low productivity, environmental degradation, timely availability of information for farming operations, loss of food grains and perishable food items, price variability and market fluctuations. The green revolution, which the country had experienced in the late sixties, left profound impact on Indian agriculture. Although the productivity has steadily progressed and reached three times in last 50 years, it remains range bound during the last decade with slow growth rate. This is because of concerns for food security. The rainfall dependency, marginalized and poverty stricken farmers, inefficient input management and inadequate knowledge of farming community is causing low returns from the marketable surplus.

India's untiring strive to increase food production is also worth mentioning. The cutting edge agricultural research in the field of core and enabling technologies such as genetics, biotechnology, crop science, soil science, entomology, pathology, agricultural economics & extension, and the various schemes introduced by the government in the form of crop insurance and incentives to the farmers are playing important role towards providing expected level food security at present. However, the natural aberrations in the weather pattern in the past successive years has created hurdles in enhancing food grain production beyond the range of 250 to 270 million tones. Therefore, the urgent need is to break the productivity doldrums with technological interference and adequate strategies to feed the ever-increasing population in the coming days.

In this regard, Prof. M. S. Swaminathan appropriately mentioned - "*We should look upon agriculture not just as a food-producing machine for the urban population, but as the major source of skilled and remunerative employment and a hub for global outsourcing.*"

Therefore, you need to utilize your knowledge and skills to overcome the situation. Dear friends, look for innovative ways to mitigate the adverse impacts and ensure: (a) blending of technologies which include core agricultural technology with information & geospatial technology; (b) adoption of sustainable pathways for progressive increase in productivity while exploiting the available natural resources; (c) reaching the benefits of technologies to the stakeholders; (d) evolving risk reduction strategies towards building safety nets for the farming community and (e) promoting agriculture as a career path. A thoughtful

and perceptive approach for well being of agriculture is the need of the hour and I am sure that the young minds have boundless potential to address the complex issues faced by the modern Indian agriculture.

The First Lal Bahadur Shastri Memorial lecture was delivered at Indian Agricultural research Institute, New Delhi by Late Dr Vikram Sarabhai, the father of India's space programme on February 28, 1969. This was the time when green revolution was just sprouting. In his address, he spoke about integration of technology, management and local wisdom to sustain 'the greenness' of the Green Revolution.

Let me quote: "*A biological system lives only as long as it receives and gives to its environment. This mutuality of all living systems with the environment imposes the need for interdependent existence*"

Therefore, contemporary technologies such as biotechnology, agro-technology, space technology and information technology need to be utilized in combinations for the benefit of Indian agriculture.

In this context, Indian Space Programme has successfully demonstrated the use of space-based inputs in studying and managing natural ecosystems. With the advantages of synoptic capabilities and repeated coverage over large area, the satellite sensors provide valuable datasets to arrive at suitable decisions in maintaining the productive capabilities of agro-ecosystems. Today, I am proud to say that it is hailed as one of the most cost-effective programmes in the world with societal outreach.

Currently, India has a state-of-the-art constellation of remote sensing satellites operating in different regions of electromagnetic spectrums.

Imageries acquired from the remote sensing satellites have contributed significantly in addressing various issues of agriculture. Beginning with the modest experiment of coconut root-wilt disease, Indian Remote Sensing Programme has grown into a full-fledged operational programme today. Our remote sensing satellites have become the prime workhorse missions for many developmental applications in the country. Some of the major applications include estimating crop acreage and forecasting crop production for major crops prior to harvesting; soil and water conservation activities for watershed development in the dry land areas; enhancing the irrigation potential and improving the water use efficiency in the irrigated command areas; monitoring the crop losses due to flood and drought.

In this regard, I would mention that ISRO and Ministry of Agriculture and Farmers Welfare had jointly initiated 'Forecasting Agricultural output using Space, Agro-meteorology and Land-based observations (FASAL)' using data from Indian Remote Sensing Satellites. It provides forecast of principal crops such as wheat, rice, sorghum, mustard, cotton, and groundnut well before harvesting. Subsequently, with the setting up of Mahalanobis National Crop Forecasting Centre (MNCFC) by Ministry of Agriculture the technology has been transferred from ISRO to MNCFC for providing operational acreage estimation and production forecasting.

India is one of the major producers of fruits and vegetables and presently it is ranked second in the world. India recorded highest production of several horticultural crops such as mango, banana, papaya, etc. As the horticulture crops are grown in a scattered way, it is difficult to assess

their production. Towards developing scientific methodology, ISRO and Ministry of Agriculture are carrying out a project called CHAMAN (Coordinated Programme on Horticulture Assessment and Management using Geoinformatics). The project aims at geospatial applications of area assessment and production forecasting of horticulture crops namely, Mango, Citrus, Banana, Potato, Onion, Tomato and Chili using satellite data.

Watershed development is a well established method for improving the productivity in dry land areas. It helps in arresting the soil erosion and land degradation and also sharing the benefits of natural resources equitably. In this regard, Integrated Mission for Sustainable Development and Sujala Watershed Development in drought-prone areas in the country have resulted in improved cropping intensity, decreased fallow lands and increased area under irrigated crops besides halting depletion of natural resources. Integrated Watershed Management Programme (IWMP) is being carried out for monitoring of watershed developmental activities in providing online satellite data, tools and mobile applications.

Availability of adequate, timely and assured irrigation is a critical determinant of agricultural productivity. In order to assess irrigated command area, remote sensing technology has been widely used in the country.

In the past decades, satellite remote sensing data has also been used for identifying different categories of wastelands towards reclamation for appropriate agriculture activities; assessing the land degradation and

desertification; identifying ground water potential zones for drinking water as well as selecting location for recharge structure; monitoring snow and glaciers of the Himalayan region; forecasting of potential fishing zones; mapping of coral reef and mangroves etc.

Currently, ISRO in collaboration with 58 Ministries/ Departments is carrying out 160 projects using space and geospatial technology. Taking advantage of the last mile connectivity of the Postal department, one of the important tasks being envisioned through their help is getting information pertaining to the condition of crops across the country and to get authentic, near real time information in case of loss of crops due to natural calamities.

Further, ISRO is providing required support for generating web based portal and mobile application towards generating soil health cards, as well as imparting training to various State level trainers. Soil Health Management (SHM) aims at promoting Integrated Nutrient Management through judicious use of chemical fertilizers including secondary and micro nutrients in conjunction with organic manures and bio-fertilizers for improving soil health and its productivity.

Communication is the backbone of any developmental processes of a Nation. Since commissioning in 1983, the Indian National Satellite (INSAT) system has brought in vast advancement in telecommunications, television broadcasting, radio networking, meteorology and disaster management services.

Farming in our country strongly depends on the weather. Medium range weather forecasting and timely advisories are the prime needs for farmers. The understanding of the physical phenomenon behind the weather including tropical convection, parameterisation, model development, assimilation into the model, etc., are some of the challenges facing the meteorological community. All these efforts need reliable and periodic observation network both from space and on ground.

INSAT based platforms are used for weather observations as it provides frequent observational capability. INSAT-3D and INSAT 3DR, carries improved imaging system and atmospheric sounder. Atmospheric Sounding Sensor provides frequent information on vertical profiles of Temperature, humidity and integrated ozone from surface to top of the atmosphere which are the basic inputs to weather forecasting models.

Another important area of space technology applications is Navigation and Location based services. Under Satellite Navigation (SATNAV) programme ISRO and Airports Authority of India have jointly implemented GPS Aided Geo Augmented Navigation (GAGAN). The system will be highly beneficial to the aviation sector as well as high accuracy positioning required for various applications. Further, Indian Regional Navigation Satellite System (IRNSS) is an independent regional navigation system. It is known as "Navigation with Indian Constellation (NavIC)" and expected to provide a positional accuracy of 10-20 m in the primary service area. IRNSS has applications in Terrestrial, Aerial and Marine Navigation, Disaster Management, Vehicle tracking and fleet management, Integration with mobile phones, Precise Timing, Mapping and Geodetic data capture, precision agriculture etc.

India has progressed steadily in the areas of launch vehicle technology. Starting with the development of Satellite Launch Vehicle (SLV-3) during 70's, it has progressed through Augmented Launch Vehicle (ASLV), Polar Launch Vehicle (PSLV) and Geosynchronous Launch Vehicle (GSLV) Mark-II and Launch Vehicle Mark-III.

India has established itself globally, having mastered the precision technologies in sending spacecrafts to Moon and Mars. The Mars Orbiter Mission is operating satisfactorily well beyond the planned orbital life and continues to provide valuable data of Martian surface and its atmosphere.

India has made a significant contribution to the global astronomy community by placing a space observatory ASTROSAT, which enables simultaneous multi-wavelength, from Ultraviolet to X-Ray, observations of stars and galaxies, to enhance understanding of universe and astronomical phenomena. India will launch Aditya-L1, a scientific mission for solar studies. The major scientific objectives of the mission are to study the solar corona and achieve fundamental understanding of the physical processes that heat the solar corona, accelerate the solar wind and produce Coronal Mass Ejections (CMEs).

My dear students, the world you are stepping into as graduates today has changed, and continues to change, at a rapid pace. Select the domain you want to pursue and put passion into it, I am sure you will achieve your goals. The 21st century is becoming highly global. With the revolution of information technology, there is abundance of knowledge resources and only you need to exploit it for your own benefit.

Indeed, there is no magic formula for success and success comes with hard work and diligence. Today you have achieved significant step and at this juncture each one of you must choose our own way. The next step would be to map your own course forward; building on the knowledge and skills you have learnt as students here.

I would end my talk by quoting father of green revolution and noble laureate Dr. Norman Borlaug who said – "*Civilization as it is known today could not have evolved, nor can it survive, without an adequate food supply*".

I thank you and wish you all success in your endeavors.