



**ORIENT AGRICULTURAL EDUCATION
TOWARDS
FUTURE NEEDS AND OPPORTUNITIES**

PROCEEDINGS

OF THE
28TH ANNUAL CONVENTION
OF
INDIAN AGRICULTURE UNIVERSITIES ASSOCIATION
JUNE 29-30, 2004

Sher-e-Kashmir
University of Agricultural Sciences & Technology (Kashmir)
Shalimar, Srinagar-191 121



Sponsors

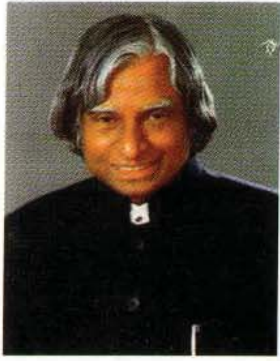
**INDIAN AGRICULTURE UNIVERSITIES ASSOCIATION
NEW DELHI**



Organizers

**Sher-e-Kashmir University of Agricultural
Sciences & Technology of Kashmir**





राष्ट्रपति

भारत गणतंत्र

**PRESIDENT
REPUBLIC OF INDIA**

MESSAGE

I am happy to know that the Sher-e-Kashmir, University of Agricultural Sciences and Technology of Jammu & Kashmir is organising the 28th annual convention of the Vice-Chancellors of the Indian Agricultural Universities Association with the theme 'Orient Agricultural Education Towards Future Needs and Opportunities' on May 1-2, 2004

Our Agricultural Universities have played an important role by participating in the Green Revolution. The faculties in the Universities should take up a noble mission by generating graduates who can spread and work for high productivity of food crops compared to what they are today. The Graduates should also be given skills to empower farmers to take up food processing and food marketing.

On this occasion, I extend my warm greetings and felicitations to all the participants and the organiser and wish the Convention all success.

(A.P.J. Abdul Kalam)

New Delhi

April 26, 2004






प्रधान मंत्री

PRIME MINISTER

MESSAGE

I am delighted to know that Sher-e-Kashmir University of Agricultural Sciences & Technology, Kashmir is organizing the 28th Annual Convention of the Vice-Chancellors of the Indian Agricultural Universities Association (IAUA) on 29-30 June 2004. The theme of the Convention "Orientation of Agricultural Education Towards Future Needs and Opportunities" is of topical relevance to boost science and technology based development of Indian Agriculture. I am confident, that the key issues confronting our nation like poverty, unemployment, environmental degradation, natural resources depletion and biodiversity loss will receive central attention during the deliberations. I look forward to the recommendations of the Convention with greatest anticipation.

I wish the Convention a great success.


(Manmohan Singh)

New Delhi
June 22, 2004



शरद पवार
SHARAD PAWAR



कृषि, उपभोक्ता मामले, खाद्य और
सार्वजनिक वितरण मंत्री
भारत सरकार
**MINISTER OF AGRICULTURE
& CONSUMER AFFAIRS
FOOD AND PUBLIC DISTRIBUTION
GOVERNMENT OF INDIA**

18, June, 2004

MESSAGE

I am glad to learn that Sher-e-Kashmir University of Agricultural Sciences & Technology is reorganizing 28th Annual Convention of the Vice-Chancellors of the Indian Agricultural Universities Association on 29-30th June, 2004 with the theme "Orient Agricultural Education Towards Future Needs and Opportunities".

State Agricultural Universities are playing a pivotal role under the leadership of the Indian Council of Agricultural Research in ushering Green Revolution followed by White and Blue Revolutions in India and now striving for Evergreen Revolution. Recent advances in science and technology and move towards the globalization of national economies world over have thrown up new challenges to be met by the Indian Agriculture. Advances in biotechnology, genomics, information technology etc. have created immense possibilities for their application to agriculture for improving efficiency of production and other related systems. Concern for environment and ecology, conservation of biodiversity the sustainability of agriculture production are some important factors which have now to be paid adequate attention. The move towards a free world trade regime requires that Indian Agriculture is competitive globally in terms of price and standards of quality. There is a need to reorient the entire agriculture system in the country to enable it to be competitive in the emerging global scenario. In this context reorientation in academics in Agricultural Universities has got prime importance.

I hope the galaxy of participants at this important Convention will come out with important conclusions towards reorientation in academics keeping in view the future needs and opportunities.

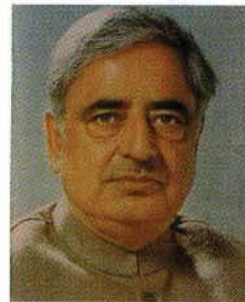
I send my best wishes for all success of the Convention.

(Sharad Pawar)



Mufti Mohammad Sayeed

CHIEF MINISTER
JAMMU AND KASHMIR



MESSAGE

I am delighted to know that 28th Annual Convention of the Vice Chancellors of the Indian Agricultural Universities Association is being organized by SKUAST-K, Srinagar on 1st and 2nd of May, 2004 with a befitting theme “**Orient Agricultural Education Towards Future Needs and Opportunities**”.

Our economy has been predominantly agricultural. Enhanced production and productivity of agricultural produce can not only change the face of our economy, but can also contribute to uplift the grass root agricultural workers of our society and thereby reshape our rural life with increased income and employment. With globalization and advancement in Technology, we have to strive for enhanced production of superior quality genotypes, besides increasing the awareness of our farmers. Occasions like this could help us to work for achievement of these goals.

I wish the event a grand success.

(Mufti Mohammad Sayeed)
Chief Minister
Jammu and Kashmir



Government of Jammu & Kashmir
Civil Secretariat, Srinagar

Abdul Aziz Zargar
Minister for Agriculture
Animal Husbandry & Co-operative
Jammu & Kashmir State



MESSAGE

It gives me immense pleasure to learn that Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir is organizing 28th Annual Convention of Indian Agricultural Universities Association (IAUA) on June 29th & 30th, 2004 at Srinagar Kashmir.

I am hopeful that deliberations of the Convention shall go a long way in improving the agricultural education in the country in general and the State of J&K in particular.

I wish the Convention and its organizers all success.

(Abdul Aziz Zargar)



सत्यमेव जयते

डॉ. मंगला राय

सचिव एवं महानिदेशक

DR. MANGALA RAI

SECRETARY & DIRECTOR-GENERAL



भारत सरकार
कृषि अनुसंधान और शिक्षा विभाग एवं
भारतीय कृषि अनुसंधान परिषद्
कृषि मंत्रालय, कृषि भवन, नई दिल्ली-110 001

GOVERNMENT OF INDIA
DEPARTMENT OF AGRICULTURAL RESEARCH & EDUCATION
AND

INDIAN COUNCIL OF AGRICULTURAL RESEARCH
MINISTRY OF AGRICULTURE KRISHI BHAVAN, NEW DELHI-110 001
TEL.: 23382629 FAX:91-11-23387293 E-MAIL:mrarai@icar.delhi.nic.in

MESSAGE

I am delighted to know that SKUAST & T, Srinagar Kashmir is organizing 28th Annual Convention of the Vice-Chancellors of the Indian Agricultural Universities Association on 1-2 May, 2004 with the theme "Reorienting Agricultural Education Towards Needs and Opportunities".

The reorientation of the current course curricula of Agricultural Education is a subject of topical consideration and significance. The liberalized domestic economic policies and the globalization of trade have thrown open new challenges and opportunities on the managers of National Agricultural Education System. Shrinking natural resources and falling productivity against the back drop of internal domestic pressures on the one hand and global commitments on the other make it a challenging task while re-engineering Agricultural Education. Futuristic Agricultural Education will have to be harmonized with these emerging issues so that it remains relevant and responsive to the future issues and concerns in the global scenario.

I am confident that this convention will help to set new milestones in agriculture which is the backbone of rural livelihoods and economic growth of our country.

I convey my best wishes for success of the Convention.

(MANGALA RAI)

April 23, 2004



Dr. Sudhir S. Bloeria



**CHIEF SECRETARY
JAMMU AND KASHMIR**

MESSAGE

I am happy to know that SKUAST, Kashmir is organizing the 28th Annual Convention of the Vice Chancellors of the Indian Agricultural Universities Association on 1-2 May, 2004 on the theme "Orient Agricultural Education Towards Future Needs and Opportunities".

This would provide an opportunity to the Scientists and Professionals to exchange their views and thoughts on various aspects of agricultural research and development and also re-evaluate curricular activities of Agricultural Universities. Our State, where rural population predominantly depends on agriculture is bestowed with different agro-climatic conditions which would require area-specific research keeping in view the bio-diversity concerns and tourism potential as well as environmental issues.

I extend my good wishes to the organizers and participants for making this convention a success.

(Dr. Sudhir S. Bloeria)

**Jammu the
23rd April, 04**



B.R. Kundal,
IAS



Principal Secretary & Secretary to Govt.

Agriculture Production Department

Civil Secretariat, J&K Jammu/Srinagar

Jammu

Srinagar

Off. 0191-2540531

0194-2470357

Fax. : 0191-2546883

0194-2479419

Res.: 0191-2476101

0194-2453883

**Subject:- Message for 28th Annual Convention of
Vice Chancellors of IAUA.**

SKUAST Srinagar Kashmir is organizing 28th Annual Convention of the Vice-Chancellors of the Indian Agricultural Universities Association on 1-2 May, 2004 with the theme "Orient Agricultural Education towards Future Needs and Opportunities".

State Agricultural Universities had a significant contribution under the aegis of the Indian Council of Agricultural Research in ushering Green Revolution and now striving for Evergreen Revolution. Major thrust has to be on the application of modern tools of Technology to increase production and productivity per unit area and time with emphasis on quality at globally competitive rates and ecologically sustainable basis. However, agricultural research and education in the Country has suffered due to inadequate financial resources which needs to be addressed to. There is also need for re-orientation in academics. Occasions like this could help us to work for achievements of these goals.

I wish the event a great success.

(B.R. Kundal)

CONTENTS

S. No.	TITLE		PAGE NO.
INAUGURAL SESSION			
1.	Welcome Address	<i>Anwar Alam</i>	1
2.	Address	<i>S.S. Baghel</i>	3
3.	Address	<i>Mangala Rai</i>	5
4.	Address	<i>Jinab A.A. Zargar</i>	10
5.	Inaugural Address	<i>H.E. Lt. Gen. (Retd.) S.K.Sinha</i>	11
6.	Vote of Thanks		13
TECHNICAL SESSION – I			
(Employment Orientation to Agricultural Education)			
7.	Reorientation of Agricultural Education Towards Future Needs and Opportunities	<i>Anwar Alam</i>	14
8.	Employment Orientation to Agricultural Education in India	<i>R.P. Singh</i>	19
9.	Strengthening of PG Education in Agriculture	<i>D.P. Singh</i>	34
10.	Employment Orientation to Agriculture Education	<i>H. U. Khan</i>	42
11.	Discussions		50
TECHNICAL SESSION - II			
(Pros and cons of Private Agricultural Education)			
12.	Pros and Cons of Private Agricultural Education in India – A special Reference to Chhattisgarh State	<i>C.R. Hazra</i>	52
13.	Privatization of Agricultural Education -	<i>V.M. Pawar, P.S. Borikar and S.D. Wangokar</i>	59
14.	Knowledge For Development	<i>Ram K. Dwivedi</i>	62
15.	Revamping Private Higher Agricultural Education in Uttar Pradesh	<i>B. B. Singh</i>	66
16.	Discussions		76
TECHNICAL SESSION - III			
(SAU Model Act implementation)			
17.	Governance of Agricultural Universities	<i>S. S. Magar</i>	79
18.	Model Act for State Agricultural Universities – Implementation Status	<i>J. C. Katyal</i>	83
19.	Discussions		88
TECHNICAL SESSION - IV			
(Niche Agriculture and Required Academic Orientation)			
20.	Niche Farming- a Paradigm Shift in Agricultural Development Process	<i>K.V. Peter and B. Mohan Kumar</i>	90
21.	Restructuring of Education and Research for Niche Agriculture Development	<i>Tej Partap</i>	92
22.	Discussions		95
23.	Recommendations		96
	Appendices		

INAUGURAL SESSION



Inaugural Session commencing with an invocation song by students of Faculty of Agriculture, Wadura, Sopore

Welcome Address

Anwar Alam

S. K. University of Agricultural Sciences and Technology of Kashmir

His Excellency, Lt. Gen. (Retd.) S. K. Sinha, PVSMM, the Governor of State of Jammu & Kashmir and the Chancellor of SKUAST-K and SKUAST-J, Hon'ble Minister for Agriculture and Co-operatives, Govt. of Jammu & Kashmir, Mr. Abdul Aziz Zargar Sahib, Respected Secretary DARE and Director General ICAR, Dr. Mangla Rai, President IAUA and Vice-Chancellor CAU Dr. S.S. Baghel, Chairman ASRB Dr. A.S. Faroda, member ASRB Dr. Abidi and most distinguished participant Vice-Chancellors of various SAUs, representatives of Press & Media, ladies and gentlemen. On behalf of SKUAST-K and on my own behalf, I most cordially welcome you to this 28th Annual Convention of the Vice – Chancellors of Indian Agricultural Universities Association (IAUA). A two days event is being held here at Srinagar today and at Gulmarg tomorrow. The event was to be held on 1st & 2nd of May 2004, but had to be postponed due to unprecedented heavy snowfall on 30th April which prevented the delegates to reach the valley. All the preparations, therefore, had to be done twice.

We are honoured by the gracious presence of His Excellency Lt. Gen. (Retd.) S. K. Sinha, the Governor of State of Jammu & Kashmir, who is also our Chancellor. His Excellency is taking keen interest in the overall development of the State and also the state of affairs of the SKUAST-K & SKUAST-J. It was his proactive role as Governor Assam and Chancellor Assam Agricultural University that Assam became self sufficient in rice through his initiative on massive programmes on shallow tube wells and farm mechanization. As Chancellor, he advised the university council to strictly adhere to the ICAR Model Act — a subject with which IAUA is concerned and wants it to happen all over the country. Despite his very busy schedule, he accepted our request to deliver inaugural address and benefit us with his treasure of wisdom and experience. We are also honoured with the presence and participation of the Hon'ble Minister of Agriculture and Co-operatives, Mr. Abdul Aziz Zargar Sahib under whose guidance and inspiration agriculture and allied activities are advancing ahead in the State of Jammu & Kashmir.

I extend warm welcome to Dr. Mangla Rai, Director General ICAR and Secretary DARE. Dr Rai, as you all know, has contributed very immensely in advancement of agriculture in the country especially agricultural research and education. He was a leader of National Seeds Project and Technology Mission on Oil Seeds and has contributed significantly in the development and popularization of hybrids of wheat, rice and several other crops and also in farmer user rights. He has tremendously contributed in the development of genetically modified crops. As National Director, he was pivotal in launching ICAR's mega project NATP for which every SAU is thankful to him. He is the architect of 10th Five Year plan in the area of agricultural research and development. He is the most able administrator I have known and at the same time a thorough gentleman with lot of compassion. His coming to valley is a good omen for all SAUs and for SKUAST-K & SKUAST-J.

I welcome Dr. Baghel, my colleague and President IAUA and appreciate that under his leadership the IAUA is convening its 28th convention in the valley. I am grateful to you for giving us the opportunity to host the convention. In Kashmir, Mother nature is at its best; flowers bloom year round in varied colours and fragrances, colorful fruits and vegetables grow; warmth of shawls could be felt; everything that a temperate climate can give shower here. What is reflected in press & media about Kashmir does not often give the real

picture of what Kashmir is and can provide. This convention, I am sure, is going to create new ambassadors of good will.

I remember Jenab H.U. Khan, Vice-Chancellor SKUAST-J, once told me that as and when opportunity comes we would host convention in Kashmir. When the venue of convention was being finalized, I was not present in the meeting and he acted on my behalf and thus here we are. As son of the soil, Khan sahib has served the State in several capacities and has vast experience in extension and development in agriculture. His presence is a source of strength for all of us. I thank you all that in spite of your busy schedule you could find time to be here with us to give your valuable inputs. SAUs feel at cross roads after having made significant contributions in India's march towards self-sufficiency in food and making the country as a food surplus nation. We are experiencing surge towards precision farming, organic farming, contract commercial farming, integrated agro processing and are competitors in IPR regime and major players in globalized agricultural markets. However, it is faced with issues of eco-sustainability. Socio-economic conditions of rural communities are far from being satisfactory. Graduates and Post-graduates that come out of SAUs are facing unemployment. Public sector employment is fast shrinking and private sector is demand driven requiring manpower equipped with modern scientific skills. SAUs as institutions feel threatened with their autonomy and academic freedom being encroached upon and eroded. While SAUs are striving for internal resource generation to meet the challenges ahead, adequate funds have to come from central and state governments to enable them to fulfill their obligations.

I welcome you once again to the Convention and expect very valuable inputs from all of you. I am personally grateful to H.E. Lt. Gen. (Retd.) S.K. Sinha, Governor and Chancellor who has graced the occasion as chief guest, Hon'ble Minister Agriculture and Co-operatives Jenab Zargar Sahib and reverend Director General ICAR, Dr. Rai and all other colleague Vice-Chancellors and their representatives. With these words, I thank you and welcome you from the core of my heart.

Thank you.

ADDRESS

S. S. Baghel

Central Agricultural University, Imphal, Manipur

His Excellency, Lt. Gen. (Retd.) S. K. Sinha, PVSM, the Governor of State of Jammu & Kashmir, Hon'ble Minister for Agriculture Jenab Abdul Aziz Zargar, respected Dr. Mangla Rai DG ICAR and Secretary DARE, Dr. Faroda Chairman ASRB, Dr. Abidi, Member ASRB, Dr. Katyal DDG Edu. ICAR, Dr. Alam Vice-Chancellor SKUAST-K, Shri H.U. Khan Vice-Chancellor SKUAST-J, other fellow Vice-Chancellors, Deans, Directors, Officers and faculty, invited guests, dear students, ladies and gentlemen. We are extremely thankful to H.E. Lt. Gen. (Retd.) S. K. Sinha, Governor of J&K, for having spared his valuable time to be here with us this morning. We are honoured to learn about your interest in the developments in agriculture and are very confident that your words of advice would go a long way in chalking out future programmes and agenda. I also wish to welcome Hon'ble Minister for Agriculture and Co-operatives Jenab Abdul Aziz Zargar Sahib for having accepted our invitation and for being here with us. I also extend very cordial welcome on behalf of IAUA to each one of you. On behalf of the association, I wish to express my gratefulness to H.E. and his government for providing us an opportunity to convene the convention in such a pleasant atmosphere. India made tremendous development in the frontiers of agriculture. Our food production increased four-fold from 50 million tons to 212 million tons by 2001-02. During the same period, the population increased by two and a half times. Even though the increasing population rates in the country undo our efforts and continuous threats are always foreseeable, food deficit India is now not only self sufficient but is also exporting to other countries. The achievements have been unparalleled in the history of nations. Food grain production has been achieved by the production of quality seeds, use of agrochemicals and adoption and use of improved technology supplemented with appropriate government policies. Subsequently, agriculture witnessed white and yellow revolutions. While you may derive legitimate pride on the achievements of the past, there are serious concerns facing agriculture subsequent to green revolution. There are problems of soil degradation, soil water and air pollution, scarcity of water etc. The small and marginal farmers constituting 75% of farming community do not get properly benefited and thus result in regional imbalances and even imbalances within region. Although food is available, it is not accessible. In spite of the revolutionary increase in food production there are more number of people below poverty line than what were before the revolution due to population explosion.

Women play a vital role in agriculture and their empowerment holds key to our development. It is imperative that a poverty-free India cannot be realized without an unprecedented growth in agriculture to sustain food security at state and national level. This requires a paradigm shift in our agricultural education. Financial health of most of our agricultural universities is extremely precarious; state government grants are inadequate even to cover the salaries for education and research. It is tragic that a teacher is paid a salary of Rs. 1 to 2 lakhs per annum but there are no grants for research. I must confess and record that ever since the joining of Dr. Mangala Rai, funds are being provided but these are not going to meet the requirements. State governments have to liberally fund the universities to enable them achieve the objectives for which they were established. Owing to poor fiscal state of affairs, some state governments feel difficulty in meeting requirements of their respective SAU's. Formulae need to be, therefore, worked out by state and central governments for funding the SAUs. SAUs established in 1960's developed in good infrastructure and equipments but now the equipments have become obsolete and redundant. To keep pace with the changing



Dr. S.S. Baghel, Vice-Chancellor, CAU Imphal and President IAUA addressing the delegates

advancements and with global developments, substantial investment is required. Since 1970s, the era witness competition in recruitment, which is a healthy trend and enables choosing the best available faculty.

ICAR conducts national eligibility test for recruitment to faculty positions; however, some universities are doing away with NET as well due to conflicting interests and reasons. There is reluctance in the faculty to move from one university to another due to time bound promotions and career advancement schemes, which results in poor motivation. Students are taking all the study programmes in the same university, resulting in inbreeding which often tells upon their overall performance. Such students are found to be not so effective teachers and researchers. To avoid the inbreeding of students, ICAR admits 15 % of UG and 25% of PG students from outside the state through national level tests and provides liberal financial support to facilitate movement of students from one university to another.

The ICAR Model Act has not been fully adopted by most of the SAUs even after four decades resulting in serious erosion in SAUs autonomy and academic freedom. Proliferation and mushrooming of institutions do not carry any meaning in situations where existing institutes cannot be funded. Such policies further aggravate the situation ruining the academic excellence. The time has come that we should consolidate rather than thinly spreading the resources. Similarly there are large number of colleges outside SAUs system having grossly inadequate facilities, producing inadequately skilled graduates and post graduates. The conversion of some unrecognized colleges into KVKs and research centers has also been recommended. However, the matter is a state subject and ICAR has no legal authority to impose standards. More and more private colleges are being established every year making the situation grave.

Our country has vast natural resources with different regions suited to different niche crops and commodities. In view of the opening of economy and globalization, more and more ventures are being transformed into private sector. The jobs in public sector are shrinking. Additional opportunities in future will therefore largely come from private sector posing challenges for SAUs to produce graduates with specialized skills and expertise required by the private sector. The PG graduates traditionally lack creativity, entrepreneurship and self-dependence. The reorientation of agricultural education with contemporary and futuristic needs is the subject of the discussion which is a departure from our earlier stands. It is time we evolve ways and means of overcoming the short-comings in our education system. During the two days of convention four thematic areas viz., 'Employment Orientation to Agricultural Education,' 'Pros and Cons of Private Agricultural Education,' 'SAU Model Act Implementations' and 'Niche Agriculture and Required Academic Orientations,' shall be immensely debated and I hope useful recommendations will emerge.

Thank you.

ADDRESS

Mangala Rai,

Secretary, DARE, Govt. of India & Director General, I.C.A.R., New Delhi

His Excellency, The Governor of State of Jammu & Kashmir, and Chancellor of SKUAST-K & SKUAST-J, Lt. General (Retd.) S.K. Sinha, PVSM, Hon'ble Minister of Agriculture and cooperatives, Jenab Abdul Aziz Zargar, Dr S. S. Baghel, Vice Chancellor, CAU, Imphal and President-IAUA, distinguished Vice Chancellors of SKUAST-K and SKUAST-J, Dr. Anwar Alam and Dr. H.U. Khan, learned participants to the convention, faculty members, representatives of press and media, ladies and gentlemen. It is indeed a matter of great pleasure and privilege to be amongst this august gathering on the occasion of 28th Convention of Indian Agricultural Universities Association being held in the beautiful city of Srinagar. The Association has rightly chosen the theme for the annual convention as "Orient Agricultural Education Towards Future Needs and Opportunities" considering the pressing need to enhance agriculture productivity and agriculture based avenues of employment, particularly for the rural youth.

India's economic security continues to depend on agricultural sector and the situation is not likely to change in the foreseeable future. Even now, agriculture supports 65% of population, as against about 75% at the time of independence. As of today, India supports 16% of the world's population on 4.2% of the world's water resources and 2.3% of the land area. Per capita availability of resources is about 4 to 6 times less as compared to the world average. Foreseeably, this will further decrease due to increasing demographic pressure and consequent land diversion for non-agriculture use.

Research has been playing a vital role in the saga of success of Indian agriculture. Technological impact on productivity growth in almost all the sectors is significant. With reference to 1950, the productivity gains are nearly 3.3 times in food grains, 1.6 times in fruits, 2.1 times in vegetables, 5.6 times in fish (aquaculture), 1.8 times in milk, and 4.8 in eggs. The technologies helped us to overcome an era of chronic food deficits to a level where we are able to export some surplus food grains. The human resources developed through agricultural education system has been instrumental in generation, assessment and refinement of technologies and their dissemination to the farming community resulting into spectacular achievements in food production.

Based on the present trends of population and economic growth, the annual increase in demand in India is estimated to be 2.6 million tones in rice, 2.2 million tones in wheat, 1.6 million tones in pulses, 4.2 million tones in fruits, 2.5 million tones in vegetables, 7.8 million tones in milk and 0.6 million tones in fish. The Xth Plan has a targeted growth rate of 4% in agriculture. This demands a concerted national efforts considering that the foodgrain growth rate was only 1.95% during the IXth Plan.

At the global level, it is estimated that the foodgrain production has to increase by 185% and it will have to come through 100% productivity increase and 85% increase in area. The increased demand has to be primarily met through enhanced production in the developing world.

Around 51% of India's geographical area is already under cultivation as compared to 11% of the world average. The present cropping intensity of 135% has registered an increase of only 24% since independence. Further, rainfed dry lands constitute 65% of the total net sown area. Also there is an unprecedented degradation of land. And groundwater resource. There is a fall in the rate of growth of total factor productivity, which has to be doubled to meet the growing needs of the population by 2050. Efficiency-mediated improvement in productivity is the most viable option to raise production.



Dr. Mangala Rai, Director General ICAR and Secretary DARE addressing the delegates at the Convention

To ensure technology-led growth and to meet the national need, it is imperative that the Indian National Agriculture Research and Education System is adequately funded to enhance its capability to compete globally. The Common Minimum Programme (CMP) of the Government is committed '*to enhance the welfare and well being of farmers, farm labour and workers, particularly those in the unorganized sector and assure a secure future for their families in every respect*'. It also recognizes the critical role of investment in agricultural research and extension, rural infrastructure and irrigation. India's National Agriculture Policy (NAP) on the other hand envisages 4% plus annual growth in agriculture during the Tenth Plan. This could be realized through technologically empowered agriculture that will enable farmers' well-being, livelihood, food and nutritional security, equity, industrial growth and economic prosperity. The overall strategy to achieve the above goal includes harnessing the potential of cutting edge science, supported with state-of-the-art infrastructure and enlightened human resource, while maintaining and building on the health of the primary production base.

We need to develop a definite 'road map' to attain the food and nutrition security that still remains elusive to nearly one-fourth of our population. Productivity and profitability enhancement will be our key concern and cutting-edge technologies will play a pivotal role. Owing to the increasing complexities in accessing the rapidly advancing science and skills in developed countries, it becomes imperative to achieve self-reliance in cutting edge of technologies.

The stated strategy of efficiency-mediated productivity enhancement needs to factor in several dimensions. The Council has drawn up a blue print to address the critical areas of research intervention that will enhance the velocity of agricultural growth in the country. The major focus is on enhancing agriculture productivity, input use efficiency and further building on research and educational capability to meet the CMP goals.

Our strategy accordingly has to be a coordinate of productivity enhancement, minimizing production losses through risk management, processing and value addition, and commercialization taking off from market intelligence. This necessitates a close realigning of the investment support being given to R & D efforts in agriculture. Some key areas calling for research intervention are water crisis, soil degradation and fatigue, genetic erosion, increasing biotic and abiotic pressures, slow pace of diversification, high post-harvest losses, inefficient nutrient and energy management, inadequate markets and unfavourable trade and increasing knowledge lag. Such a situation demands much higher research investment intensity.

Losses due to biotic (insect-pests, diseases, weeds) and abiotic (drought, salinity, heat, cold, etc.) stresses account for about one-fourth of the value of agricultural produce. These losses can substantially be reduced / prevented through use of cutting edge technologies involving gene deployment across barriers, integrated pest and nutrient management and judicious and effective use of resource saving technologies. For this, development of appropriate biotic and abiotic stress resistant varieties of field and horticultural crops, animal and fish; integrated pest management, especially bio-control agents and their availability; resource conservation technologies (zero tillage, bed planting, till planting, soil health management); development of sustainable technologies for reclamation and management of salt-affected and water logged soils; development of farm machinery for attaining higher work efficiency; promotion of protected horticulture would be essential.

The losses due to livestock and poultry diseases are around 20% (Rs. 21, 000-28,000 crores annually) of the value of output of livestock. The focus would be to reduce these losses through development of improved / new generation vaccines, diagnostics, epidemiology and forecasting of diseases. Similarly, diseases in shrimp and carp have caused major losses in aquaculture over the years. The efforts will be to develop diagnostics and formulate drugs, to reduce the losses. There are a number of viral diseases that are causing

tremendous losses in field and horticulture crops. Diagnostics for viral diseases will help in providing virus-free planting material for field and horticulture crops.

Seed is the basic and essential input for agriculture; other inputs of technology are contingent upon quality seed for being optimally effective. Inadequate availability of quality seed, planting material and germplasm is presently a constraint for enhancing productivity. Therefore, production of seed, planting material and germplasm in case of field and horticulture crops, animals and fish has to be enhanced both in terms of quality and quantity. This would in turn require strengthening of infrastructure for rapid multiplication of disease-free, value-added, quality seed and planting material and fish seed production.

The major efforts are required to develop suitable post-harvest handling technologies; high value, diversified products including conversion of waste into wealth; develop state-of-the-art facilities for processing of agricultural produce on regional basis; referral laboratories for development of standards and certification of processed products; identification and improvement of microbes for enhancing shelf-life and quality of agriculture produce.

Concerns on efficiency stem from the fact that the current level of efficiency of natural resources (water, bio-energy, plant and animal residues), feeds and fodders and man-made inputs (fertilizers, pesticides, fossil energy) are unacceptably low. Furthermore, when resources and inputs are used inefficiently, both cost of cultivation and threat for biosphere pollution increase and production decreases.

Currently only 29% of the total precipitation is conserved, that too is not optimally utilized. With the existing practices, water use efficiency seldom exceeds 40%. It is well accepted that inefficient use of water also leads to inefficiency of all other resources / inputs. Thus, the strategy will have to follow an integrated approach emphasizing greater conservation and enhanced efficiency of water.

At present, the nutrients' use efficiency ranges from 2 to 50%. Strategies to improve nutrients use efficiency could be adoption of holistic approach across different production system, integrated nutrient management system, identification of niche areas for organic farming, harness inter-dependence of nutrients on water use efficiency (fertigation), village level formulation and production of multi-nutrient sources, techniques and technologies for converting waste to wealth and breeding for nutrient-efficient plants, animals and fish.

The modern methods of farming require higher levels of energy than the tools and machines of the past. Low use efficiency of energy is a matter of serious concern from economic and environmental points of view. Since agriculture is becoming more and more mechanized, issues related to poor mechanical efficiency also come in the forefront of energy management. In

view of the limited fossil fuels, we need to focus research thrust towards renewable energy sources, energy-efficient devices and machines, optimizing use of animal draught power and develop tools and implements for drudgery reduction.

Judicious and balanced diversification is a viable strategy to enhance income and employment, minimize risks and allow efficient and sustainable use of natural resources. In order to benefit from potential of diversification, we need to have enterprise choices for small and marginal farmers and landless workers, land use capability-based production systems, multiple use options for alternative farming, agro-forestry systems for arable and wastelands, input use addition and reduce contamination in agricultural produce including livestock and fish products.

Given the diversity and magnitude of the challenges before Indian agriculture, it is certain that application of knowledge based advanced technologies and skills would be indispensable wherein highly competent human resources would be required. We have to build indigenous capacity to develop our human resources. The initial goal of setting up of at least one SAU in each State and a Central Agricultural University in the northeast region of the country has since been achieved.

In our National Agricultural Research and Education System, most of the premier agricultural research institutions have chronic financial problems and therefore, desired modernization of facilities could not take place for decades. In the context of the new science and advancement in instrumentation, most of the equipment and instruments have become obsolete or unserviceable and need immediate replacement. Several research facilities like laboratories, pilot plants, farm-buildings; audio-visual facilities, etc. have become outdated and ill, seriously hampering the efficiency of the research and education system.

A process has commenced in the Council to identify one or two specific areas in each University to serve as a Centre of Excellence in advanced research and first-rate human resource development. Some selected areas of core competence in teaching, research, consultancy and other services, to be developed in each area of core competence, are being identified by various agricultural universities.

The traditional universities and agricultural universities put together perhaps constitute one of the largest higher educational systems of the world in terms of number, disciplines and clientele. Presently cooperation between the two, though highly desirable is not visible, as much one would have desired. Primarily due to compartmentalization of basic disciplines dealt exclusively by the traditional universities and applied science subjects falling in the domain of agricultural universities. These narrow loyalties of and affiliation to discipline based education narrows down the applicability of outcome and impact of contribution by the either system of education. General universities have a long history of quality research in basic biology, which have led to several of theories and principles. However, these did not emanate from work on food crops or important animals, thus limiting their applied scope. Similar examples can be cited from physical and social sciences. Likewise, applied research many a times could not travel beyond the institutional walls because of absence of basic science principles to backstop the findings or precluding the possibility of converting point studies into area action plans.

General universities and technical institutions in areas of electronics information technology, space technology, molecular biology and biotechnology have made spectacular advancements. These sciences and technologies have tremendous applications in rural development in general and agricultural and allied sciences in particular.

It is in this context that cooperation not only between agricultural and traditional universities but between institutions of higher learning in all disciplines is the need of the day. Some of the areas, which have very high scope for cooperation between general universities and agricultural universities include molecular biology and biotechnology, WTO and IPR, distance education, quality assurance in higher education, environment sustainability, conservation and exploitation of biodiversity, information technology, governance and management, taxonomy, social science, environmental protection and resource sharing.

There are numerous other areas in which a highly meaningful output and outcome with immense development impact in terms of economic benefits and can be realized by symbiotic association between the traditional universities and institutions of National Agricultural Research and Education System. The scope of cooperation is vast, what is needed is to put it into an action mode.

Development of physical infrastructure and modernization of laboratories by way of advanced research equipments and human resources development, both; in agricultural and traditional universities has been a hallmark of scientific developments in the country. On account of the high costs involved, it may not be possible or even feasible for each institution to create such facilities individually. We need to be more forthcoming to share these facilities for enhancing the quality of research and also use the training infrastructure / facilities available in other institutions for mutual benefits. This will not only rationalize the expenditure in R&D programmes but also ensure optimum utilization of the facilities.

An aggressive and effective human resource development programme to meet the existing and emerging needs is critical. The agricultural education System has to play a far bigger role before this transformation is complete and sustained. I am sure the deliberations in the annual convention will address some of the issues of enhancing productivity, resource use efficiency and exploring potential of cooperation so that our institutions of agricultural education continue to be effective partners in making India an enlightened and technologically empowered nation.

I once again thank the organizers for giving me this opportunity to share with you some of my thoughts on reshaping agricultural research and education in the country.

Thank you.

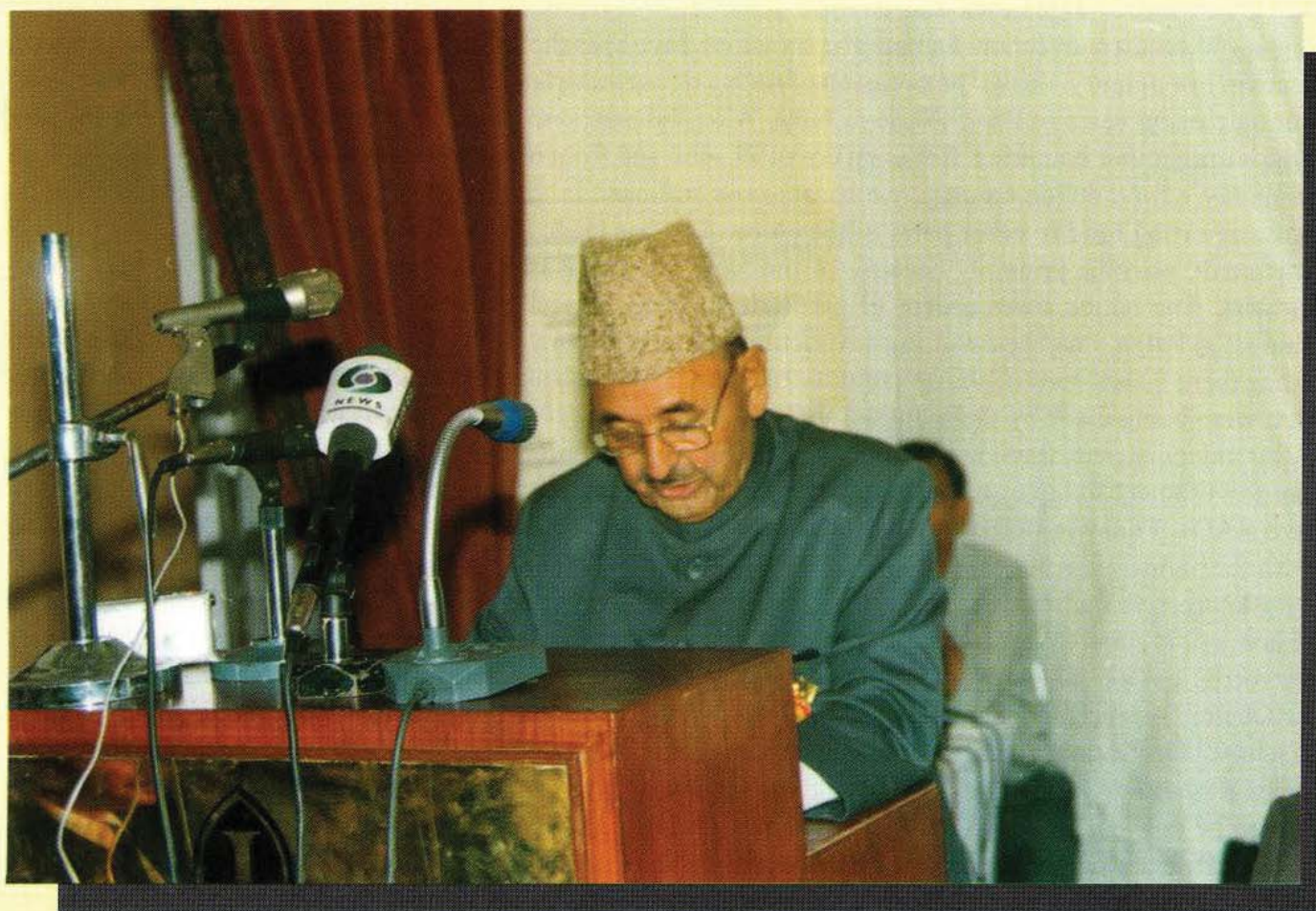
ADDRESS

Jenab Abdul Aziz Zargar

Minster for Agriculture and Co-operatives, Government of J&K State, Srinagar

His Excellency, Lt. Gen. (Retd.) S. K. Sinha, PVSMM, the Governor of Jammu & Kashmir, Jinab Dr. Mangla Rai, our Guest of Honour, Dr. S.S. Baghel, Vice-Chancellor CAU Imphal and President IAUA, Dr. Anwar Alam Vice-Chancellor SKUAST-K, Jenab H.U. Khan Vice-Chancellor SKUAST-J, Dr. Katyal, Dr. Faroda, Dr. Abidi, respected scientists and guest delegates. At the out-set, I would like to tell you that our beloved Chief Minister Jenab Mufti Mohammed Sayeed was very keen to personally come and interact with the delegates, but could not make it because of some pressing engagements. I tender an unqualified apology on his behalf. I have the immense pleasure to be here with you and take part in the deliberations. As you all know, this state suffered tremendously during last fourteen years of turmoil due to which our economy suffered a setback. Our reverend Chief Minister emphasized towards modernization of agricultural sector – be it livestock, horticulture, apiculture, sericulture or saffron and kala-zeera cultivation. Sir, as we know, socio economic development of our State depends on agriculture and its allied sectors. The growth in population has overwhelmed and has put our agriculture on cross roads. Areas where rice & wheat were previously grown are full of dwellings leaving very little land for cultivation. Adequate steps are therefore needed to be taken to ensure food security. Agricultural universities and state developmental departments need to work hand in hand under such situations to improve the production scenario of the state. But financial constraints create hindrances in this direction. Infact, infrastructural development of this university started two decades back but remains yet to be completed due to paucity of funds. I want the attention of Dr. Rai: this university had started the construction of two buildings but had to leave them half way due to financial crunch. The state government is thankful to the government of India for providing Rs.65 crores to SKUAST-J for development of infrastructure but at the same time SKUAST-K also deserves liberal financial support. On this occasion, I would like to request Dr. Rai to kindly sanction at least the same amount to SKUAST-K. I also wish different universities of the country to have an arrangement of exchange of faculty and research scholars. This is the best occasion to sort out such arrangements. I understand that basic and applied science has advanced considerably and such exchange would be fruitful and hence be made a regular feature. I have all praises and appreciations for the research and extension activities being carried out at SKUAST-K and also for its Vice-Chancellor. A number of rice and other cereal crop varieties suited for plains and higher altitudes with short maturation periods have been released and many more are learnt to be in pipeline. Scientists of the university have proved their mettle in the fields of their activities. With such talented and dedicated human resource, I am confident we will achieve self sufficiency in all sectors of agricultural economy. The father of green revolution of India Dr. M.S. Swaminathan, acknowledged the talent of Kashmiris and remarked that Kashmir will attain self-sufficiency and be hunger free if things go in right direction. I wish this convention and its organizers all the success.

Thank you very much.



Jenab Abdul Aziz Zargar Saheb, Minister for Agriculture & Co-operatives Government of J&K State
addressing the delegates

INAUGURAL ADDRESS

His Excellency Lt. General (Retd.) S.K. Sinha, PVSM

The Governor of J&K (Chancellor, SKUAST-K)

Jenab Abdul Aziz Zargar, Hon'able Minister for Agriculture and Cooperatives, Dr. Mangala Rai, Director General ICAR and Secretary DARE, Dr Anwar Alam, Jenab H.U. Khan, worthy Vice-Chancellors, eminent scientists, ladies and gentlemen. I consider it my privilege to be invited to inaugurate this convention being attended by such dignitaries and eminent scholars in agriculture. I congratulate SKUAST-K for having organized such a convention. Famine and starvation have been the recurring phenomenon in pre-independence times in our country. I have the occasion of seeing devastating famine of unprecedented proportions in 1943 during closing years of British Rule in India. After independence, we as a nation, were dependent for food grains upon other countries. It was an era of PL-480 and from 60s a miraculous transformation took place. Primarily a food deficit country, we became self sufficient in food with granaries overflowing and we are now exporting food to other parts of the globe. This has indeed been a great success story of our times. It was made possible primarily because of the hard labour put in by agricultural scientists and hard toiling farmers. The nation owes a debt of gratitude to them. I recall that before independence, when I was a student in Patna, I had heard of Pusa Agricultural Institute in my state. I was not fully aware what they were doing there. I also knew of an Agricultural college at Naini, Allahbad. I was not fully aware of the contributions that were being made by these agricultural institutes. I remember I had not heard of any SAU at that time. After independence, there was a thrust on development of agricultural knowledge and it became a policy of our government to have an agriculture university in every state. We in Kashmir are fortunate that we have two SAUs. Today in our country, we have 34 SAUs, one CAU and five deemed agricultural universities with the annual pass out capacity of 13,500 agricultural graduates, 5,000 M. Sc, and 1500 Ph.D's – indeed very impressive figures. I am highly impressed by an inspiring address by Dr. Rai, he has fire in his belly and vision in his mind. We produce capable people in every discipline as for example some world famous personalities like the leader of oppressed "Mahatma Gandhi" or the national poets "Rabindra Nath Tagore or Ghalib" or nuclear scientist "Dr. H.J. Bhaba" or missile man "Dr. A.P.J. Abdul Kalam" or agricultural scientist "Dr. Swaminathan." We have the potential and through education can produce required result to make this country truly great. We have the goal before us to take this country to the status of a developed nation by the year 2020. Dr. Rai has rightly pointed that agriculture plays a vital role in our country where two third of our population depends on agriculture. Mahatma Gandhi had said that India lives in our villages and the prosperity of our country is through developments in agriculture, and to traverse this road, our agricultural scientists have to play a very vital role. In modern day and time, higher education has to be job-oriented. Our agriculture universities have for a long time been contributing in this direction. Our SAUs contributed to green revolution that we ushered in our country. Today's requirement is to transform Green Revolution into an Evergreen Revolution. We have limited land space; population is growing enormously; there is limited water and other resources. Our agricultural scientists have to find ways and means of increasing the production in spite of all these constraints. In the era of globalization, agriculture has now to be globally competitive. We should be able to efficiently use our resources while at the same time protect our interest through the process of patenting. Last year, I invited Dr. Swaminathan for a seminar on agriculture. He devised a road map for us for all the three regions (Kashmir, Jammu and Ladakh) of our state each with different climate and terrain. I am happy to learn that Jammu & Kashmir is among the first few States to have the lowest percentage of population living below poverty line. The road map spelt out by Dr. Swaminathan indicated that this proportion of population is to be reduced to zero level. I am confident that under the



His Excellency Lt. Gen. (Retd.) S.K. Sinha, the Governor of J&K State and Chancellor SKUAST-K, delivering the inaugural address

leadership of Jenab Zargar Sahib Inshallah we will achieve this objective and I wish J&K becomes the first such state in the country.

With these words, I would like to formally inaugurate this convention. I would welcome all the scholars who have come and express my confidence that this convention, by sharing the knowledge and experience of such eminent people, would prove successful in disseminating knowledge and improving our human resources in the field of agriculture so that we can advance and progress beyond all expectations. I wish this convention an all out success.

Thank you

Vote of thanks

H.U. Khan

S. K. University of Agricultural Sciences and Technology of Jammu, Railway Road, Jammu

I have proud privilege of thanking Lt. Gen. (Retd.) S.K. Sinha PVSM, the Governor of J&K and the Chancellor SKUAST-K and SKUAST-J, Jenab Abdul Aziz Zargar, Hon'ble Minister of Agriculture & Co-operatives, Dr. Mangala Rai, Director General ICAR and Secretary DARE, Dr. Baghel, Vice-Chancellor CAU Imphal and President IAUA and above all my colleague, Dr. Anwar Alam, Vice-Chancellor SKUAST-K, besides other colleague Vice-Chancellors from other Universities, Dr. Faroda, Dr. Abidi, ladies and gentlemen who have come here attending this convention since morning. After Dr. Baghel narrated the problems the universities are facing, there seems no need for me to talk about them today. During these two days of convention, the discussions on the topics, that have been chalked out, will bring to lime light all such problems, constraints and follies, especially when the convention is being held in such a serene environment as Kashmir. I would again like to thank Dr. Alam because he had to do the whole process of making necessary arrangements twice. Both of us kept waiting at Srinagar Air Port to see our guests landing when instead we saw the snow marching. We then learned that both the aircrafts had to return to Jammu and I along with Dr. Alam had also to return resulting in deferring of the convention. Dr. Alam didn't lose heart. Such was his resolve to hold the convention. Dr. Alam deserves all the praises and I thank him on my behalf and on behalf of all the delegates who have made it here. About Jenab Abdul Aziz Zargar, I am reminded of a fact that in 1970's when he was State Minister for Agriculture, I happened to accompany him on a tour to Hurpora Shopian in Kashmir. His popularity was such that he had to stay back there. Since no prior arrangements were made, some adhoc arrangements were made for our stay. A separate room arrangement was made for Jenab Zargar and I along with other three persons was accommodated in another room. But the moment he came to know our uncomfortedness, he immediately surrendered his room in our favour and he himself slept on floor with other farmers. Such is his belongingness with the farming community. I hardly can remember an occasion when he denied his participation; of course it was only once and that was in my university's convocation. With these words, I thank you all who have come from different nook and corner of the country and also to the Press & Media personnel.

Thank You

TECHNICAL SESSION - I

Reorientation of Agricultural Education Towards Future Needs and Opportunities

Anwar Alam

Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Shalimar, Srinagar (J&K)

Human civilization, more so the Indian Civilization, is essentially agricultural civilization. The momentous transition from nomadic hunter-gatherers to rural homesteads was the discovery of rudimentary agriculture, first human experience of benefits of domesticating plants and animals. The Sanskrit root of Arya is *Ar*, the plough. This finds reflections in other languages too, like 'to plough' in Greek is *arotron*, in Latin *aratium*, 'a plough' in Slavic is *oradlo* and in English 'fit to be ploughed' is *arable*; *aroma* is a word to describe peculiar fragrance that emanates from a ploughed field. The name Arya originally meant 'the people who plough' a proud distinction from their neighbours, Tura, the sheep-raising, steppe-roaming robbers. Thus over a period word Arya became synonymous to 'Civilized' (1,2).

Modernization of India in a way is history of modernization of its agriculture and allied activities. Advances in traditional agriculture during ancient and medieval periods sustained it up to 19th century. However, later part of 19th and early 20th century had visitations of droughts, famines, mass morbidity and mortality to human beings and animals. It forced the British, administrators of the time, to address to agricultural education and research, and six colleges of agriculture were established imparting knowledge, diploma and degree programmes in agricultural sciences, an applied science and technology affiliated to university education system.

Quality of human resource is the biggest wealth of a nation. In India, agricultural education and agricultural development have gone hand in hand. Though modern agricultural education was initiated in pre-independence India, it made rapid strides after independence when the founding fathers of modern India took a resolve to prevent recurrent famines of the past. Repeated exercises under the most renowned academicians of the time and finally as outcome of an Indo-American team setup by Government of India emerged a major policy decision to have State Agricultural Universities (SAU) on the pattern of American Land Grant Colleges with integrated mandate of teaching, research and extension education in every major state. Establishment of GBPUAT Pantnagar in 1960 was the first manifestation of this policy. Today there are 34 SAUs, five Deemed Universities (DUs) and one Central Agricultural University (CAU) with annual intake capacity of 13,500 graduates, 5000 M. Sc and 1500 Ph. D's covering almost all specializations of agricultural sciences and technology. Rapid expansion in agricultural education has, however, adversely affected the quality. Faculties which started later had to face resource crunch finding it difficult to make up the deficiencies. State Governments are finding it difficult to fulfill their obligations. Globalization of markets and WTO agreements have thrown new challenges of global competitiveness, right sizing, efficiency and short time response to changing market scenario. The growing unemployment to SAU graduates and postgraduates brings SAUs at cross roads, and are, therefore, obliged to discuss and evolve mechanisms that meet the new challenges and harness new opportunities.

Impact of State Agricultural Universities

Independent India faced chronic food shortages and had to go with begging bowl to developed nations for food aid. Food imports strained economy, and "ship to mouth" was no satisfying situation as a nation. SAUs played proactive player in agricultural development in the country making available well trained personnel to man planning and execution. Also, SAUs provide location- and situation- specific technologies



Prof. Anwar Alam, Vice-Chancellor SKUAST-K, Srinagar presenting his paper at the Convention

responsive to modern agricultural inputs, thereby increasing production and productivity in an economically viable manner, scientifically and technologically back-stopping upstream and downstream activities. Through Lab to Land Programme and Krishi Vigyan Kendras, technologies were taken to field and demonstrated at farmers' door steps. Hands on experiences were given to them to build up their confidence and skills on new technologies generated. Relevant knowledge was recasted for farmers' use through multimedia. Scientific database generated makes it possible to think of modern precision farming.

In 1967-1968, within a decade of establishment of SAUs, India witnessed Green Revolution with quantum jumps in production and productivity of rice and wheat- the staple foods of the country. In quick succession, we had White Revolution in milk production, Blue Revolution in fishery and aquaculture, and Yellow Revolution in vegetable oils. Unprecedented quantum jumps in production and productivity have taken place in horticultural crops and poultry, which is no less a revolution. Indian National Agricultural Research System is striving for Ever Green Revolution. From a food deficit nation, we have emerged as food and nutrition self-sufficient and now are in a position to share our bounty- full harvests with less fortunate nations of the world. Niche Farming, Contract Farming and Organic Farming have gained ground. While in the past, we thought of 'seed to seed' in agriculture we are now talking of 'production to consumption'. Post-harvest technology to retain quality and minimize qualitative and quantitative damages during on-farm handling, transport, storage, marketing and distribution as well as value addition to produce and by-products for additional income and employment through development of processed is gaining impetus products thus convenience foods, processes and pilot plants have acquired focus.

Research and developmental efforts are on to make agriculture free of drudgery through improved tools, implements, and machines appropriate for Indian agriculture where small and marginal farms, below 2 ha, predominate. Mechanization has become a necessity not only for increasing production and productivity with conservation of inputs, time and energy but also for social reasons. Unfortunately, farming is looked down upon socially. Traditional farming involves a lot of drudgery, ploughing of one hectare land just once with a *Desi Hal* involves 40 km of walking. There is social stigma attached to ploughing with bullocks but the same work performed with a tractor or power tiller has no such taboo. Thus farm mechanization imparts dignity to work. In agricultural operations, women are major work force. Ergonomic studies have revealed that farm equipments have been designed for men and there is need for removal of gender bias in farm equipment which is now being addressed.

SAUs are fine-tuning agricultural technologies through R&D for global competitiveness, economy and profitability. Needs of domestic and export markets are being addressed in terms of quality of produce, processing, packaging and certification. Biotechnology is being harnessed for increasing productivity, bringing in quality attributes and disease and pest resistance. Hybrids in

Proceedings of the 28th Annual Convention of IAUA

food grains, fruits, vegetables and ornamentals have been developed both in public and private sectors, currently latter having edge. Globalization of markets has made R&D demand-driven failing which results may not see their commercialization. There is knowledge explosion for proper decision making, thus help of modern information technology is absolutely essential. With public funds shrinking for teaching, research and extension education, there is necessity to use IT in education through distance learning. Reaching to the unreached is more convenient and economical through IT distance learning processes, for which databases softwares, websites and portals are being developed. ICAR has played a pivotal role in this area. State Governments have also attached priority to IT at the SAUs. However, IT connectivity at the individual farmer's level is yet a distant dream but access is possible.

Agricultural Education and Employment

Higher education is acquired not just for the sake of knowledge but for acquiring capacity to be employed or self-employed. Initially agricultural graduates and postgraduates had better employment opportunities

than other areas of learning. However, we have reached to a point where the public sector, that employed graduates and postgraduates of agriculture and allied disciplines is saturated: Vacancies are not being filled due to paucity of funds or shift in policy; demands in future are going to be minimal. Now employment, what so ever, is mostly in private sector, and is demand-driven with requirements of specialized skills of bio-technology, information, mechanization and automation, post-harvest technology, value addition and niche agriculture etc. Courses and curricula and areas of specialization have to go through paradigm shift. SAUs have to prepare new brand of experts who worry about natural resource conservation and recycling, rain water wastage and wasteful use of irrigation water.

In the coming years, agricultural produce will have to become competitive globally in terms of price and quality. This would need greater infusion of frontier science subjects such as bio-technology, information & communication technology, crop modeling, agri-business management and entrepreneurship, mechanization, automation and post-harvest technology etc. The Agricultural Education System in our country is hard pressed to keep pace with the technological, economic and social developments taking place nationally and internationally. Job opportunities in public sector are shrinking and unemployment is rising. Currently, 43 per cent of graduates and 23 per cent of the post-graduates are not finding jobs in the first instance. Thus, a strong need is felt to re-vitalize and re-engineer our Agricultural Education, so that competent human resource is produced that can meet the challenges of development in agriculture.

Concern for improving the agricultural education stems from the fact that there are many stakeholders who have high expectations from the agricultural education by the universities and ICAR system. Funding agencies- State Government, ICAR and Central Government, Science and Technology Departments- as a group, are one kind of stakeholders. They have an abiding interest in education because they look to its fruits in terms of knowledge-empowered individuals whose performance, as service providers and scientists, promises substance of productivity, growth and fulfillment of intellectual obligations. The group also expects help in devising efficient and effective delivery systems for the benefit of society and industry. The other group of stakeholders includes the students, the teachers, the parents and the society at large. They respectively look to education as a means of job security and better living (students), professional satisfaction / accomplishment and career advancement (scientists and teachers), old-age security through well being of wards and availability of and accessibility to food and other essentials of quality.

It has been opined that agricultural education must aim to build and develop self-competence, self-confidence and self-reliance. Growth of individuals in knowledge and ability to perform and impact with that knowledge has now been recognized as the central theme of education. In order to reach that goal, education focus must shift from teaching to learning format so that State Agricultural Universities produce professionals and not dependent degree holders.

Emphasis on self-employment is of typical significance, since the number of job opportunities are falling and job-seekers increasing. Prevalence of widespread unemployment among agricultural graduates- a situation unheard of in the past- has been cited as an evidence of this imbalance. The corrective measures of shifting stress on practical training calls for keeping students as the nucleus of development through agricultural education. Therefore, agricultural education must infuse: (i) focus of purpose that discourages multiplication of white-collared job seekers, (ii) initiatives to build creative talent that encourages ability and confidence to set up agri-business ventures/services aligned to rural environs and culture, and (iii) uninterrupted flow of information updates on discoveries and inventions, market trends and consumer preferences to make output competitive. In essence, it is suggested to prepare students in knowledge and skills capable of converting rural-based strategic opportunities into employment.

Privatization of Agricultural Education

Traditionally higher education in agriculture has been largely public funded. Now Central and State Governments are experiencing financial constraints which are reflected in their commitment to higher education. But it is through higher education that talents from resource poor sections empower themselves. Students seeking admission to agriculture often from urban areas and those who could not get into prime fields of medicine, engineering, computer science etc. It reflects in their emotional attachment to the course of agriculture and its quality. Methods and mechanisms should be evolved to attract rural students.

Scientific base at under-graduate levels has to be strong so that the students quickly respond to rapid scientific advances. Global competitiveness demands quick responses to changing market scenario which is acquired by strong base in basic sciences.

After the establishment of SAUs it was hoped that private colleges of agriculture may fadeout. However, it has not happened. Instead Allahabad Agricultural Institute is now a Deemed University and there are about 51 private colleges affiliated to various traditional universities. SAUs have mostly constituent colleges except recently a few have affiliated private colleges. Due to resource crunch and infrastructural constraints, quality of education in many of them is not up to the mark. Research and extension education programmes are poor at non-existent. A committee appointed by ICAR under the Chairmanship of Dr. Kirti Singh recommended financial support to few of them, whereas the rest are not worth recognizing.

Autonomy of Agricultural Universities

As true for any university, autonomy, academic freedom and adequate resources are pre-requisites for efficient and effective working of SAUs. The Model Act prescribed by ICAR for SAUs are supposed to be followed in letter and spirit. However, for the reasons beyond control, aberrations have crept in badly encroaching the autonomy and academic freedom of the SAUs in many states. It needs to be restored on priority. It is not an easy task as political intervention in SAU affairs have increased. A model act that meets the expectations of the stake - holders needs to be evolved. ICAR has a model act on which they want to have tripartite agreement by State Government, SAU and the ICAR. It is easier said than done.

Niche Agriculture

India is bestowed with varied climate and soil and water resources. Each agro-ecological niche is best suited for a few crops and commodities. In this age of globalized market and globalized competitiveness, harnessing of agro-climatic niche is of great economic importance. Every SAU should try to equip its graduates for self-employment in production, processing, packaging and marketing of niche crops and commodities besides instituting the specific course contents. The niche crops and commodities should be identified and universities assisted in faculty improvement and processing and packaging facilities in these areas so that they become centres of excellence for identified niche crops in due course. The Agri-Export Zones created by APEDA are based on agro-ecological niche of a state or region. Such a reorientation in agricultural education will establish requisite scientific and technological linkages between SAUs and Development Departments in export of AEZ commodities. ICAR has done possibly a preliminary exercise in the recent conference of the Vice-Chancellors; however it needs closer scrutiny and more comprehension.

References

1. Choudhary, SL, Sharma, GS and Nene, YL. 2000. Ancient and Medieval History of Indian Agriculture. Rajasthan College of Agriculture, Udaipur.
2. Pagozin, ZA. 1984. History of Vedic India. Mittal Publications, New Delhi

Employment Orientation to Agricultural Education in India

R.P. Singh

Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan

In macro-economics, 'income' and 'employment' are interchangeable terms. In the short run, national income depends on the total volume of employment in the country. The classical theory of employment postulates the assumption of full employment of labour and other productive resources and flexibility in prices and wages to bring about full employment. Employment in agriculture has great role in sustainability of rural livelihood through sustainable growth of agriculture, social development, poverty alleviation and food security. Employment is stated as the power house of one's livelihood and income is the fuel which is generated out of employment. There exists a two-way relationship between employment and education. Employment in relation to education is more supported by the perception of educated unemployed rather than any stipulated theories. The relevance of employment in agricultural education is directly linked with the agricultural prosperity which is the basis of rural livelihood.

At the dawn of new millennium, mankind has to ensure three important functions, viz., (i) transmission of total heritage to coming generation, (ii) educating the present generation to face the future challenges, and (iii) initiating concerted efforts to shape desired future of mankind.

None of the above tasks can be accomplished without ensuring the graceful survival of human beings. Human beings from all geographical regions, ethnic groups, culturally diversified backgrounds and economically scattered classes need careful attention to make strategies for dignified survival of each and every individual. In the present socially dynamic, economically vibrant and technologically galloping era, every nation is talking of global concerns but of protecting the local interests. These interests cannot be protected safely without giving the consideration to natural resource base and quality of manpower to rationally use these resources for inter-generational equity. Hence, there is a great need to examine and re-examine the strength, weaknesses, opportunities and threats of the educational system, keeping in mind the thrust for sustainability of natural resources. The relevance of agricultural education in this context is all the more important and seeks attention of all the stakeholders of the system.

The history of strategic agricultural development in the country during the last century could be perceived in three broad phases. The first phase relates to pre-independent era where the focus of agricultural development was to meet the needs of British Industries. The stoppage of cotton supply from USA to England compelled the British rulers to institute the Department of Agriculture in India, in late eighties of nineteenth century. The famines of 1876-78 and 1899-1900 were other compulsions leading to the birth of Imperial Agricultural Research Institute in 1905 at Pusa in Durbanga district of Bihar and subsequently agricultural colleges in each of the important provinces of the country. The Royal Commission of Agriculture proposed the constitution of Imperial Council of Agricultural Research (ICAR). The food crisis created by the second world war and Bengal famine of 1943 were events of very great concern which led to the institution of "Grow More Food" Campaign in 1943 itself. The emergence of central committees on cotton, lac, jute, sugarcane, coconut, tobacco, arecanut, spices, cashewnut, etc. during pre-independent period amply reveals the hidden agenda of imperial government to sustain the British industries and the Interest of British people. The food grain production was a neglected area for them. Thus, we inherited a food deficient agricultural situation at the time of independence. The free India had the herculian task of making our food bowl self-sufficient.

The second phase relates to the post-independent planned era where self-reliance in agriculture had been the prime goal of agricultural development. The accelerated production of agricultural commodities, specially food grains has been the main thrust of agricultural development in this phase. The strategic approaches to achieve this goal were centered on evolution of appropriate technologies, policy interventions and institutional support. The systematic efforts in this direction paid rich dividends. The present net-work of agriculture educational institutions is the outcome of institutional set up required and developed during this period. The strategic approach to strengthen the crop and livestock production and systematic development of agricultural resources and infrastructure were taken up under well planned strategies and closed economic environment. The progress recorded in agricultural sector took the forms of revolutions. The spectacular progress achieved in foodgrain production through green-revolution, milk production through white-revolution, oilseeds production through yellow-revolution and fish production through blue-revolution is known to all. Today, our agriculture is not only self-sufficient but surplus in many commodities. A country which struggled to manage deficit agriculture is now confronting to manage the surpluses. The onus of making our agriculture sustainable over time through ever-green revolution lies on the present generation.

The third phase is the period of liberalization, privatization and globalization under the WTO regime. The agricultural development in this regime is focused more on global concerns including trade. The WTO Agreement on Agriculture (AoA) is centred around market access, aggregate measure of support (product specific and non-product specific subsidies) and agricultural export subsidy prevalent in developed countries. The sanitary and phyto-sanitary clauses, Trade Related Intellectual Property Rights (TRIPS), Trade Related Investment Measures (TRIMS) etc. lay more emphasis on quality products and trade related concerns. Besides, the agricultural sector in the present regime has to address a set of globally relevant goals like food security, fodder security, sustainability, environmental safety, balanced eco-system, natural resource management, export orientation, competitiveness, bio-diversity conservation and a host of other issues. No doubt, our existing agricultural education system is not potential enough to absorb the shocks of all these forces. At this juncture, the declining trend in the employment capacity of the system adds further gravity to the situation.

Institutional Network for Agricultural Education

The three vital strategic components based on which the Indian agriculture was meticulously transformed during the planned era included technology packages, institutional support and policy interventions. The radical metamorphosis of agriculture could be made possible through adequate technically qualified manpower developed within the country. The institutional network for agricultural education developed after independence has assumed the status of “National Agricultural Education System”, which is one of the largest in the world. The task of agricultural education in the country is mainly taken care of by 261 colleges covered under 34 SAUs, one CAU, five Deemed to be Universities, three Central Universities, one IIT and 16 State General Universities.

Keeping in view the complexity of rural employment scenario, the net-work of KVKs was also supposed to play a supplementary and complementary role through various extension education modes. The KVKs were expected to play a role of rural polytechnique centres by upgrading and augmenting the competence of rural masses for better employment opportunities. Barring few KVKs, most of the KVKs could not deliver the goods in the desired manner.

Spectrum of Study Areas and Intake Capacity

The National Agricultural Education System is so developed to impart Bachelor's level education in 11 broad disciplines which include Agriculture, Horticulture, Fishery, Forestry, Home Science, Sericulture,

Dairy Technology, Agricultural Engineering, Food Science Technology, Agri-Business (including marketing), Banking and Co-operation. The Agricultural Universities and Institutions together are offering Master of Science (M.Sc.) degree in as many as 95 specialized disciplines of agriculture and allied subjects and Doctor of Philosophy (Ph.D.) programme in 80 disciplines.

SWOT Analysis of Agricultural Education System

Capital formation is a pre-requisite for enhanced income and employment. Those areas which witnessed fairly good prospects of capital formation in agriculture did provide employment opportunities not only to the farm family workforce of such areas, but also to the labour force seeking employment from other parts of the country. The employment prospects of our agricultural education system could be better understood by critically analysing the components of the system. The SWOT analysis of the agricultural education system in the country in terms of crucial components of institutional setup, students, faculty, curricula, infrastructure and institutional linkages is summarized in Table 1.

Paradigm Shift in Employment Scenario of Agricultural Graduates

As per available estimates of Applied Manpower Research Institute (AMRI, 2000), upto the year 2000 the country produced about 1,66,200 graduates in agriculture and allied areas, 78,200 post-graduates and 11,400 doctorates. The employment pattern of agricultural graduates during this period has been to the tune of 50 per cent in public sector, 20 per cent in private sector, 12 per cent in research and academics, 6 per cent in financial institutions including NGOs, 2 per cent self-employed and the remaining 10 per cent in other spheres.

Table 1. SWOT analysis of Agricultural Education system in India

Component of the system	Strength	Weakness	Opportunity	Threats
Institutional Setup	Diversified teaching programmes with UG programmes in 11 broad disciplines, masters degree in 95 specialized disciplines and Ph.D. in 80 disciplines	Lack of desired responsiveness to the changing scenario and temporal needs	GATS under WTO opens up scope within and outside the country	Entry of foreign universities under GATS and capturing the market of agricultural education
End product (Students)	Supply of trained manpower in various areas of agriculture	Lack of competence, confidence and entrepreneurial ability	Self-employment opportunities and private sector job market	Lack of employment options for minimum survival
Faculty	Diversified in various disciplines	Lack required upgradation, competence and skill development	Responsiveness to complex situation	Teacher-taught quality link (inefficient teacher makes poor students)
Curricula	Sound theory oriented	Inflexible, mis-match between theory and practical leading to lack of risk bearing capacity and confidence	Entrepreneurship building	Increased unemployment & under employment problems
Resources and infrastructure	Availability of established labs and equipment, research and instructional farms, competent faculty and effective teaching, research and extension linkages with feedback mechanism.	Lack of adequate updating & modernization of resources	Potential to respond to the needs of time	Imbalances between resource components for ensuring sustainability
Institutional linkages	ICAR at apex level for ensuring inter-institutional linkages and mobilizing financial support through national and international agencies	Inadequate and in effective linkages between institutions and SAUs system and also with other institutions.	Better use of resources and developing competence and confidence in the output	If linkages are made with poor institutes, things may worsen rather than improving

From early sixties, when we systematically initiated agricultural education in the country, to early nineties, the education system was supply-driven as the employment situation had been very comfortable for agricultural graduates. The research and development efforts targeted for achieving self-reliance in agriculture opened

up a series of avenues for employment during this period. The agricultural education system was well-set to prepare the graduates to meet the requirements of various public sector organizations. The goal of accelerated agriculture production was largely entrusted to government sponsored public sector departments and institutions.

The study (AMRI, 2000) on unemployment scenario in agricultural education conducted at the behest of Education Division of ICAR indicated that 43 per cent of agricultural graduates and 23 per cent of the post graduates were unemployed in the country. The employment situation does not seem to have improved during the last four years, rather it has become worse. The temporary positions of Research Associates and Research Fellows in time bound NATP and other projects add to the gravity of the problem on termination of these projects.

With the opening up of the economy and the obligation to adhere to the stringent clauses of Agreement on Agriculture (AoA) under WTO, the process of liberalization, privatization and globalization has become the order of the day. Development of 'demand-driven' human resource is a major challenge for the present National Agricultural Education System. Besides, by 2020 the country is committed to be in the group of developed countries. With the accelerated growth of industry and service sector, the share of agricultural GDP is expected to sharply decline from the current level of 28 per cent. The type of agricultural human resources required to face the present challenges and those likely to emerge in the near future, are not the one loaded with traditional knowledge which lacks creativity, entrepreneurship and self-confidence. Business orientation and management skills for our graduates have become not only necessary but essential. The sooner we care to restructure our course-curricula with the aim of confidence building and competence development, the better will be the prospects of our agricultural graduates. Keeping in view the drastically declining prospects for public sector employment, the agricultural graduates and post-graduates have no option but to change their mind set for public sector job. They will therefore, have to orient themselves with the emerging job markets either for self-employment, or for private sector jobs.

Challenges of Agricultural Education System

The agricultural education system in the country is confronted with a number of challenges. There are problems in developing faculty competence and resource base for agricultural graduates on the lines of requirement in the job market on one hand and the sharp decline in the public sector employment opportunities on the other. These are major threats in ensuring employability in the existing agricultural education system in our country. Some of the major challenges of agricultural education system in this context include:

- i) lack of sensitization in the system towards re-engineering the agricultural education befitting to the needs of the time;
- ii) steady decline in financial assistance to the universities from central and state govt. sources;
- iii) emergence of a number of frontier areas of learning and limited access/opportunities for learning in those areas;
- iv) mis-match in the trained agricultural manpower required at present, specially in the private sector, and currently supplied by the system;
- v) existing set - up for discipline - oriented and commodity - based teaching and need for multi-disciplinary and system based knowledge;
- vi) high rate of in-breeding of students and faculty;

- vii) limited opportunities to widen faculty-mix specially in areas like business management, information technology, environmental sciences etc. in various faculties of SAUs which limit the quality of education and entrepreneurship development;
- viii) decline in the share of public sector employment;
- ix) information gap in the perspectives of private sector opportunities;
- x) lack of confidence, entrepreneurship and competence for self-employment by agricultural graduates and post-graduates;
- xi) globalization of higher education services under General Agreement on Trade in Services (GATS) of WTO and likely entry of foreign universities in the country either as partners with local institutions or by establishing own institutions;
- xii) lack of flexible and need-based course-curricula in agricultural education system;
- xiii) lack of adequate inter-institutional linkages, leading to duplication of activities, and inadequate harnessing of benefits;
- xiv) lack of career development opportunities for existing faculty members; and
- xv) proliferation of SAUs in sectoral areas of agriculture specially when flow of financial resources are shrinking;

It is a reality that the expected professionalism could not be brought into the agriculture educational system despite increasing the duration for graduation by one extra year. There is a great need to build professionalism in agricultural education by suitably remodeling class room instructions, practicals, agricultural experience programmes involving actual work experience and allowing opportunities for development of management skills, creativity and entrepreneurship through industrial mode of operation.

Reform Measures in Agricultural Education

Ever since the inception of systematic agricultural education system on Land Grant Pattern of USA, integrating teaching, research and extension education functions in early sixties in the country, several committees and commissions were made to review agricultural education system. It is a fact that agricultural education system in the country enjoys a unique status at global level. Some of the initiatives for reform measures in agricultural education were made through following efforts:-

- i) The first Dean's Committee (1965)
- ii) Agriculture Universities Review Committee (1977)
- iii) Second Dean's Committee (1981)
- iv) Third Dean's Committee (1995)
- v) Swaminathan Committee to Examine Agricultural Education System (1997)
- vi) IAUA National Symposium on University Autonomy and Quality Improvement of Higher Education, MPUAT Udaipur, (2003).
- vii) Deliberation on 'Employment Orientation in Agriculture Education' in Vice-Chancellors' conference New Delhi (February, 2004).

i) Dean's Committee Report on Agricultural Education

Reform in higher education in agriculture has been a topic of very high relevance. At the ICAR level, improvement of curriculum in agriculture was initiated through Dean's Committees, namely: The first Dean's Committee of 1965, the Second Dean's Committee headed by Dr. N.K. Anant Rao (1981) and the Third Dean's Committee headed by Dr. Kirti Singh (1995). The Agricultural Universities Review Committee headed by Dr. M.S. Randhawa (1977) reviewed the progress of Agricultural Universities, after examining various aspects of organizational structure, functions and relevance of course curriculum. It is worth mentioning here that the implementation of Third Dean's Committee recommendations facilitated to bring in uniformity in duration, semester system and course curricula of under-graduate studies in various disciplines of agriculture at national level. The Third Dean's Committee headed by Dr. Kirti Singh also made recommendations regulating postgraduate education in various State Agricultural Universities.

It is worth pointing out that flexibility for positive improvement has been lost due to over emphasis on uniformity. For the purpose of national level competition, such uniformity may prove to be beneficial, but the lack of knowledge on local issues may adversely affect the prospects for local employment options of agricultural graduates.

ii) Swaminathan's Committee Report on Education for Agriculture

The Swaminathan Committee constituted by the ICAR in 1997 with special reference to development of linkages between State Agricultural Universities and ICAR institutes is another milestone event at the national level for excellence in agricultural education. The report of the committee entitled "Education for Agriculture: bridge to a century of hope on the farm front", included a series of recommendations. Though employment orientation to agricultural education has not been a stipulated term of reference of this committee, many of its recommendations have bearing on enhanced employability of agricultural education in the country. It is evident from the fact that the recommendations of this committee covered aspects like farm graduate for the new millennium, women's technological empowerment, end-to-end approach, global competitiveness, harnessing frontier science and technology, strengthening partnerships, human resource development, land and water use planning and management of climate impact on agriculture, integrated development of crop and animal husbandry, fisheries and forestry, user orientation to agricultural education, non-degree training programmes, Krishi Vigyan Kendras and spreading the technocracy moment, computer-aided extension and instruction, manpower planning, fisheries education, education for sustainable agriculture, feasibility of introducing agriculture in school at 10+2 level and pre-high school level, improving education in private agricultural colleges, distance education and harnessing the tools of information technology, enhancing the social relevance of agricultural education, personnel policies for remedying regional imbalances, uniformity in educational standards, centres of advanced studies, financial support and achieving a learning revolution.

The concluding remarks of the recommendations of Swaminathan Committee read as follows:

"Fifty years ago, our first Prime Minister Pandit Jawaharlal Nehru said everything else can wait but not agriculture. The experience of the last 50 years shows that wherever there is satisfactory agricultural progress, there is alleviation of poverty and increased livelihood security. Hence, it is in the national interest that education for agriculture receives overriding priority".

iii) IAUA National Symposium on University Autonomy and Quality Improvement of Higher Education

The IAUA sponsored symposium held in November, 2003 at Udaipur not only helped to sensitize the issues of higher education in agriculture by the top level managers of agriculture education but provided a

platform for a lively dialogue on these crucial issues. The deliberations were centred on aspects like status of agricultural education in India, conceptual issues of university autonomy, challenges and opportunities of higher education, excellence and quality assurance in higher education and agriculture education in the context of globalization. The recommendation on quality improvement of higher education included suggestions like restricting intake for higher education, adequate provision for faculty upgradation, HRD development to evolve teaching programme in frontier areas of sciences, launching job oriented certificate and diploma programmes, strengthening the institutional net-work, etc.

iv) Deliberations on Employment Orientation to Agricultural Education in Vice-Chancellors' Conferences

The Vice-Chancellors' conference held on 19-20 February, 2004 at New Delhi, provided a splendid opportunity to deliberate on various facets of this vital issue. The detailed presentation made by Deputy Director General (Education) highlighted the employment pattern of agricultural graduates and post graduates and also dilemma of rising unemployment in agricultural education. Issues like declining share of employment in public sector, lack of knowledge on needs and prospects of employment opportunities, lack of entrepreneurship competence, mis-match in demand and supply, inflexible course curricula, lack of para-professional support services, etc. emerged as pertinent issues during discussion. Suggestions like launching non-formal agricultural education, restructuring four year graduate programme, changes in course curricula to reorient agricultural education so as to respond to contemporary and emerging needs, development of faculty competence, establishing linkages between stakeholders, manpower need assessment, etc. emerged as important issues during the discussion.

Suggested Strategies For Employment Oriented Agricultural Education

It is unaffordable to refrain ourselves from reorienting agricultural education in consonance with contemporary and futuristic needs of job markets. Traditional emphasis on production of mere degree holders without concern for their relevance and utility to various stakeholders and sectors of economy for the service and employability of our graduates will be of very little use. The present dilemma in the employment prospects of agricultural education and the solutions to the problems are not confined to the agricultural education system alone. There are a number of extraneous factors. The overall change in the economic environment and government policies have resulted in drastic changes in all the sectors of the economy. The implication of such changes in agriculture is inevitable. However, we cannot remain as silent spectators as far as the agricultural sector, specially agricultural education, is concerned. Some of the strategies to enhance employability of agricultural education are discussed as under:

i) Systematic Manpower Need Assessment

The foremost task is a systematic assessment of quantitative and qualitative manpower requirements in agriculture sector at national and regional levels. Such an assessment must focus on opportunities both within and outside the country. The possible consultancy services in other developing countries to launch systematic agricultural education in those countries by providing expert services, private sector potentials within the country in production, processing, distribution, input delivery, technological services, etc. will have to be systematically assessed. Self-employment opportunities are to be identified and also ways and means to operationalize such options will have to be systematically evaluated. The avenues of employment may include public sector, private sector, NGOs and self-employment options.

ii) Regulation of Admissions in On-going Courses

Once the manpower need exercise is systematically made, the supply side of manpower is required to be

matched with the manpower demand. If necessary, the intake capacity and the number of admissions in existing subjects/disciplines will have to be regulated based on current and future employment opportunities.

iii) Introduction of Need-based Programmes

The existing agricultural education system has been devised with a view to supply trained manpower in different strategic components of agricultural development like evolution and dissemination of agricultural technologies, institutional support and policy interventions to augment the production of various agricultural commodities. The avenues of such employment were mostly in public sector institutions. With the change in the focus from quantitative production oriented agriculture to qualitative production and agricultural trade, a number of new areas of learning have become relevant and inevitable to ensure sustainability of agricultural education system. Such new courses may include newly emerging frontier areas of sciences, entrepreneurship building areas, agri-business and management related areas. Such programmes need not be continued, these can be intermittently offered depending upon the job prospects. Keeping the focus on job market, the introduction of subjects and methods of teaching and learning aligned fully with employability should form the core of the strategy for new programmes in agricultural education. While making the blue-print for reengineering the course curricula, there is a great need to consider the other sectors of economy, country's national commitment and international obligations. The course curricula must find adequate importance on newly emerging global concerns like sustainability, food security, livelihood security, bio-diversity conservation, natural resource management, environmental safety and new areas in agriculture like farming systems, hi-tech horticulture, precision farming, green cultivation and so on.

iv) Introduction of Para-professional/Vocational Courses in Job-oriented Areas

Apart from crop production centred areas of learning, there is abundant scope for employment opportunities in agricultural service and support areas. Introduction of para-professional/vocational courses in applied areas of agriculture for grass root level services designed for secondary and higher secondary (10+2) level students may help to limit the undesirable intake in agricultural higher education. This option was highlighted by Dr. Katyal while making presentation on employment oriented agricultural education in the last meeting of Vice-Chancellors' Conference. The NABARD has also come out with a number of self-employment support programmes for agricultural graduates in the country. Broadly, these include agri-clinics and agri-business service centres. The NABARD refinance scheme includes setting up of agri-clinics / agri-business centres by agricultural graduates. The basic objective behind this scheme is to supplement the efforts of government extension system. Agri-clinics make available supplementary sources of input supply and services to needy farmers on cost basis and they provide gainful employment to agriculture graduates in the newly emerging areas in agricultural sector. Agri-clinics are envisaged to provide expert services and advice to farmers on cropping practices, technology dissemination, crop protection from pests and diseases, market trends and prices of various crops in the markets and also clinical services for animal health, etc. which would enhance self-employment of agriculture graduates and productivity of crops/animals. Agri-business centres are envisaged to provide input supply, farm equipments on hire basis and supply of other services.

Besides, there are a number of newly emerging micro-enterprises like production of seeds of field and horticultural crops, mushroom, sericulture, apiculture, lac culture, vermi-compost, bio-agents, fruit and vegetable processing and preservation, cut-flower, rabbitary, piggery, dog farming, ornamental fisheries, etc. Agricultural services also have lot of entrepreneurial potentials. Some of such courses, facultywise, are given in Table 2.

Strategic attempt in these areas may help to promote self-employment programmes on one side and also to find gainful employment by developing agricultural services as a viable option for generating employment avenues for trained agricultural technicians and graduates on the other side. The NCERT has also already identified potential areas in agriculture and allied areas for para-professional/ vocational courses.

v) Launching P.G. Diploma Courses in Potential Areas of Employment

It is a fact that the agricultural graduates lack required confidence, competence and entrepreneurship under the present system of education. In order to bridge this gap and to encourage graduates towards entrepreneurship and self-employment options, there is a great need to introduce diploma programmes which are competence building and entrepreneurship developing. The efforts made in this direction by the MPUAT in collaborative mode have been encouraging. The PG diploma in 'organic agriculture management' in collaboration with R.R. Morarka GDC Rural Research Foundation Jaipur and also Diploma programme on 'Fashion Designing' in collaboration with Zee Interactive Learning Systems Ltd. New Delhi were started on self-supporting basis. Initially placement seems encouraging for these programmes. Depending upon the success of these, more programmes can be planned. Such programmes have the flexibility to run on intermittent time mode basis rather than on continuous mode, depending upon the needs and job availability.

vi) 'All Courses Mode' to 'Selected Course Mode' in SAUs

At a time when flow of funds from government sources for developing infrastructure and facilities is shrinking, all SAUs should not try to run all possible programmes. Rather, a selective approach to run potential courses in terms of infrastructural facilities and faculty competence can help to run such courses more effectively. The competence and confidence so developed in the outgoing students will help them to acquire suitable jobs, befitting to their competence or alternatively they can start entrepreneurial activities, which in turn help them to be job providers rather than job seekers.

Table 2. Diploma and certificate courses in Agriculture and allied fields

S.No.	Faculty	Diploma Programmes	Certificate Courses
1	2	3	4
1.	Agriculture	<ul style="list-style-type: none"> Seed Technology, Multiplication and Certification Micro-Propagation through Plant Tissue Culture Bio Agent Mass Multiplication and Insect Pest Mgt. Agricultural Trade, Import-Export and Marketing Organic Farming and Vermi-compost Management Post Harvest Operation and Grain Storage Soil, Water and Agro-chemical Testing Soil Health Care and Management Integrated Pest Management (IPM) Pest surveillance, diagnostic and control services 	<ul style="list-style-type: none"> Seed Processing Post harvest management centres for sorting, grading, standardization, storage and packaging Soil and water quality testing Feed processing and testing centres Vermi-culture Bio-pesticides Sericulture Apiculture Mushroom cultivation Poultry Production and Management
2.	Horticulture	<ul style="list-style-type: none"> Nursery Raising and Management Growing of fruits having demand in local, national and international market Horti-based industries for agro-processing and value addition Hi-tech horticulture and precision farming Cold storages and cold-chains for horticultural crops Seed production of horticultural crops Minor forest produce (like tendu leaves, gum, honey bee raising, googal gum, sericulture, mushroom, lac culture, etc.) Export of cut flowers 	<ul style="list-style-type: none"> Vegetative propagation Packing and packaging Storage and preservation and post-harvest handling Kitchen gardening Raising of medicinal and aromatic plants Floriculture Landscape and garden management Running a floral shop. Preservation of fruits Preservation of vegetables.

S.No.	Faculty	Diploma Programmes	Certificate Courses
1	2	3	4
		<ul style="list-style-type: none"> • Fruit and vegetable preservation • Cashewnut processing • Seed spices processing • Cultivation and processing of medicinal and aromatic plants 	
3.	Veterinary and Animal Sciences	<ul style="list-style-type: none"> • Feed formulation and feed manufacturing • Horse farming • Dog farming • Poultry Disease diagnosis and control • Small ruminant rearing • Treatment and healthcare • Veterinary clinic establishment • Lab animals production and supply • Rabbit, goose and quill production 	<ul style="list-style-type: none"> • Semen freezing • Artificial insemination • pregnancy diagnosis • Feed additives • Preparation of mineral mixtures • Preparation of Antibiotics • Serum and vaccination • Poultry processing • Egg processing
4.	Agricultural Engineering	<ul style="list-style-type: none"> • Fabrication of Farm Equipment-Maintenance & Mgt. • Soil and water conservation techniques • Repair and maintenance of farm machineries • Energy applications in agriculture 	<ul style="list-style-type: none"> • Tractor driving and care • Motor winding and electric power • Maintenance, repairs and custom hiring of tractors, threshers and other agricultural implements and machines • Material and workshop practice
5.	Home Science	<ul style="list-style-type: none"> • Textiles and apparel designing • Fashion designing • Food service management and dietetics • Preparation of bread and yeast leavened production • Institutional hospitality management • Early childhood education and care 	<ul style="list-style-type: none"> • Garment design • Dye techniques • Child care and health • Soft toys • Production of cosmetics
6.	Fisheries	<ul style="list-style-type: none"> • Fish seed production • Reservoir Fisheries • Waste utilization in fisheries • Ornamental fish culture 	<ul style="list-style-type: none"> • Fish meal production • Net making and mending unit • Fish fillet production unit • Fish processing and preservation
7.	Dairy & Food Technology	<ul style="list-style-type: none"> • Fruit and vegetable processing technology • Cereals, legumes and oilseeds processing technology • Milk and dairy products processing technology • Meat, fish and egg processing technology • Spices, condiments processing technology • Bakery, confectionery and pastry product preparation • Beverages and fermentation product preparation 	<ul style="list-style-type: none"> • Drying & Dehydration • Milk testing • Pasteurization • Food packaging • Feeding of dairy animals • Feed mix preparation

vii) Establishment of Centres of Excellence in SAUs

In terms of faculty competence, effective teaching, research and extension education integration and laboratory and field facilities, each university may have certain potential areas and disciplines which can be developed into centres of excellence in these areas. Definitely, the advantages of such centres will be harnessed by the students also. The quality enhancement in teaching in such areas will push up the employability of the outgoing students specialized in concerned areas. Such centres improve the quality of research also.

viii) Faculty Upgradation and Competence Development

The existing faculty in SAUs are mostly trained in discipline oriented teaching system prevailing there. The course curricula were also drawn as warranted by time at the time of their education. With the emergence of WTO and AOA, trade in agriculture, agribusiness, agro-processing activities, international trade and managerial and communication skills, have become more dominant. The information and communication technology has also changed drastically during the recent years. The education technologies and education methodologies including e-learning are also coming up in a big way. The access to Internet and library software's have brought out drastic changes in the process of learning leading to quality improvement in

teaching. Computer oriented teaching system is also a need of the time. Besides, orienting the teachers with such programmes of relevance organized by reputed institutions can help them to upgrade their competence. In order to impart teaching with latest education technology and methodology, the faculty upgradation and competence is a need of the time. By all means, efficient and interactive teaching will add to the confidence building and competence of students to effectively compete in the job market.

ix) Induction of Newly Emerging and Relevant Supporting Faculty

The current system of agricultural education has the scope for supporting courses from related disciplines. In most of the SAUs, the teaching of courses in areas of business management, computer application, information technology, etc. are taught by faculty members who are not competent to teach such courses. The induction of competent faculties in such areas will definitely help the students to develop required confidence and competence in such areas. The lack of entrepreneurial development in the outgoing students is attributable to ineffective teaching of such crucial courses, negligible emphasis on practicals and unwillingness to hands on practical training.

x) Inter-Institutional Linkages

Effective linkages of SAUs with other teaching and research institutes of respective areas and also with institutes absorbing the trained manpower either in private or public sector including agro-based industries, is presently a mis-link. Such linkages to the extent of faculty/resource person exchange programmes and through other means of collaboration and cooperation will facilitate to perceive the problems of demand and supply sources of trained manpower in the most befitting manner. The feed back of such attempts will help to induct required changes in curricula for the effective employability in agricultural education. The inter-institutional linkages including those with the industry will have to be promoted.

xi) Preparedness for Overseas Opportunities

There is a great demand for Indian teachers and experts in developed and developing countries. An assessment of overseas opportunities of agricultural experts by a competent organization and suitably training persons at institutes like National Academy of Agricultural Research Management, MANAGE, etc. may help to find job opportunities for the unemployed educated persons. The international competitiveness in agricultural education being enjoyed by the country can also be projected to enhance employment capacity by providing job opportunities for agriculturally trained human resources in overseas countries.

xii) Other Options

In order to enhance employment potential in agricultural education, there can be other means like, private sector intervention in agricultural education, check on inbreeding, application of multimedia and other modern teaching aids, application of distance mode of education in agriculture, etc.

Employability of agricultural education is a topic of very high contemporary relevance. The solution to the problem is more complex than the problem itself. All the stake-holders have to put together their mind and wisdom for devising mechanism to resolve this problem. It is a fact that the total solution to the problem cannot be explored from within the system. The reforms in agricultural education with remodeling of the components of agricultural education system may lead to evolve solutions partially. As partners of the system, the SAUs and ICAR institutes will have to work hard to resolve the problem to the extent possible. Both short-term and long-term strategies will have to be evolved. More and more deliberations at national and regional level to make the gravity of the problem felt by all concerned may itself lead to identification of feasible solutions. The proposed strategies are centred around the crucial components of agricultural education

namely, the institutions, students, faculty, curricula, resources and facilities. More specifically, manpower need assessment, regulation of admissions, launching of more need based teaching programmes including diploma and certificate courses, introduction of 'selected courses mode' in SAUs, establishment of centres of excellence, faculty upgradation, induction of supporting faculties in the relevant areas, inter-institutional linkages and preparedness for overseas assignments, private sector intervention in agricultural education, effective check on inbreeding, enhanced application of multi-media, application of distance education mode, etc. are some options to get over this problem on short term basis. In any case we cannot remain as silent spectators to this burning problem. Proposed Job-oriented Diploma/Certificate Courses in different faculties.

Strengthening of PG Education in Agriculture

D.P. Singh

JNKVV, Jabalpur - 482 004 (M.P.)

Ancient and medieval history of Indian agriculture has its relevance to agricultural sustainability. As a result of age old agrarian civilization in India which however existed even during medieval period, the food grain production has increased about four fold since independence, and now it is a prime national agenda for speedy development of agricultural production. This spectacular progress has gained further momentum with the onset of first agricultural university. Since the setup of first agricultural university in 1960 at PantNagar, the agricultural education has become a pivot and function's as a trigger for a prosperous agrarian economy. By now, we have 35 (excluding five Deemed Universities) agricultural universities and our agricultural research system happened to be the second largest in the world, after only that of the United States of America. Today the SAUs are producing more than 12,000 agricultural graduates every year, out of which only 2000 are able to find government jobs. Nearly, 10,000 agricultural graduates every year are working either in private sector or remain as reservoir of technically trained manpower. Hence, there is a need for strengthening of our agriculture education especially at the front of employment generation and skillful use of trained manpower. In addition to modernize the UG education for entrepreneurship development and other crucial needs, the strengthening of PG education by covering the gaps, in the core areas and inclusion of frontier areas is of paramount importance to make HRD programmes more effective and meaningful at National and international levels. The 21st century is technology driven with profuse information explosion; only the specialized knowledge will make us powerful and competitive.

The ICAR has taken initiative to have quality improvement and recommended model course curricula and syllabi for PG programmes to be run uniformly in all the SAUs. The model course will have more credit to thesis/project work as compare to core courses, which will definitely improve the quality of agricultural graduates.

Model Course Curricula at PG level

a) Emphasis on quality

Structured around a core curriculum of post-graduate students, the programmes should train students with optional courses from related disciplines. There should be series of problem-oriented seminars focused on the most pressing policy issues of the day. In addition, the universities should undertake exchange agreements with other universities worldwide.

New developments in science and technology, having significance in higher agricultural education, relate to the fields of biotechnology including tissue culture, micro-propagation technology and cloning technology, genetic engineering, bioclimatology, agro-meteorology, remote sensing, information technology and computerization and new agricultural management systems with increased stress on complex inter-related areas (e.g. sustainable development and natural resources management, post harvest technology, farming systems development and integrated pest management), and demand completely different approaches to curriculum design, teaching/learning and resource use. Teaching programme have to be geared to the need of agricultural and rural development by adopting system research approach. Although a series of different disciplines are involved, these must be seen as elements, which compliment each other and form a sound holistic base using systems approach. The inter-disciplinary characteristics of agriculture and systems approach

need to be fully reflected in agricultural curricula development. Every agricultural graduate should be able to comprehend agriculture as an organic system comprising of technical, economic, social and cultural elements.

To further improve and sustain the quality of agricultural education, the Indian Council of Agricultural Research has set up an Accreditation Board. One of the important aims of this board is to periodically assess curricula of various programmes and suggest the required modifications.

b) Relevance to changing needs

The PG programme both at M.Sc and Ph.D level, besides teaching, also includes the research component in most of the SAUs. After admission of the student in a particular discipline, he is required to offer some core courses from his own discipline and minor and supporting courses from other disciplines keeping in view his research project as suggested by the advisory committee. The PG students should be encouraged to offer their major, minor and supporting courses in those areas which require a greater attention for reshaping our futuristic requirements of trained manpower covering different aspects of sustainable agriculture. The issues which need special attention while framing the new course curricula at PG level keeping in view the challenges of tomorrow are briefly discussed here. It is needless to mention that most of these issues are complex in nature and would require a multi-disciplinary (cross listed courses between disciplines) core group of courses in key areas of agricultural activities for reshaping tomorrow's agriculture.

Reshaping of Core Courses

a) Soil health

The maintenance of good soil health is dependent on the socio-economic aspects and awareness about other alternatives in developing a sound economic base. Shrinking land area, decreasing efficiency of various inputs, increasing danger of residual ill effects of chemicals, imbalanced use of fertilizers, deterioration in the physical properties and soil biology in the rhizosphere, and several other aspects of soil degradation are going to be more serious in future than ever before. It is, therefore necessary to expose our graduates by strengthening the existing PG courses in soil science and or framing a few inter-disciplinary courses to maintain good soil health. The major aspects which need special attention for course curricula development in this vital field are:

- Integrated Nutrient Management system
- Balance sheet of nutrients under different production systems
- Crop root systems in relation to soil environment
- Organic manures and bio-fertilizers
- GIS application in soil and water resources mapping
- Precision farming for high input use efficiency

b) Water Management

Indiscriminate use of this scarce resource has resulted in soil degradation, hydrological imbalances, low efficiency and several other socio-economic and environmental problems. To optimize crop production under limited supply of water, the plant breeding and management strategies should be aimed at maximizing water use efficiency. In addition to crop transpiration, water may be lost from the system in conveyance,

application, surface evaporation, transpiration by competing weeds and through run-off and deep percolation below root zone. Thus, an efficient utilization of water warrants adoption of better conveyance and application systems, selection of crops/their cultivars and management practices directed to increase water use efficiency and productivity/production on sustainable basis. Though most of the agricultural universities have adequate number of courses to cover various aspects of agricultural water management, the following areas, however, need special attention in terms of course curricula development at PG level:

- Socio-economic aspects of water management
- Water production functions in relation to availability of water and other inputs
- Soil- plant- atmospheric water relations and irrigation management
- Crop co-efficient and pressure systems of irrigation
- Rain-watershed management
- Water management in problematic soils and water conditions

c) Pest Management

Use of pesticides has become an integral part of modern agriculture. However, intensive and indiscriminate pesticide use, resistance build up in certain species to pesticides and increasing public concern about their entry in food chain and their adverse effects on environment and human health have led to a wide spread appreciation of the integrated pest management (IPM). Development of suitable cropping systems based on IMP/IWM strategies, transplanting them into action, selecting proper bio-control agents that have enhanced parasitic and survival ability and establishment of plant clinics in the rural areas through suitably trained graduates are some other potential areas needing further intensified efforts. The field of biotechnology and genetic engineering offer a great scope for development of bio-pesticides as well as resistant crop plants to selected herbicides.

The course curricula which need attention in the area of IPM and IWM at PG level should include:

- Integrated pest management including pesticide resistance
- Integrated Weed management including herbicide resistance
- Degradation and residue management of pesticides in soil, plant and atmospheric systems
- Biotechnology in relation to pest management
- Plant clinics, application efficiency and quality control of pesticides

d) Integrated Farming System

Considering the requirements of ever increasing population and technological development, agricultural scientists should suggest suitable packages to the farmers under varied farming situations. In such new agro-technological packages, not only the crop production should be kept in mind, but holistic approaches of integrated farming systems, having the components of dairy, poultry, fisheries, bee-keeping, floriculture, mushroom culture, agro-horticulture, silvi-pasture, agro-forestry, etc., should be added to generate more employment and income of farming community on long term basis. There is also a great scope to augment farmers' income by suggesting suitable crop diversification like growing of export oriented crop commodities (Basmati rice, durum wheat), flowers, fruits, medicinal plants and hybrid seed production. All these agro-

technological changes will demand intensive cropping, greater use of inputs and proper care of soil health and environment. It will also require a thorough knowledge of the whole system, marketing forces and socio-economic returns.

Major emphasis in course curricula development, therefore, should be given to strengthen this important area in which crop commodity-based education and research system should take the shape of cropping and integrated farming systems approach. This will need the incorporation of the following aspects in the course curricula of agronomy and allied disciplines.

- Composting and re-cycling of organic farm wastes
- Ecology of cropping system
- Integrated farming system
- Resource optimization

e) Production physiology

There have been concerted efforts in the discipline of plant physiology to study the effects of different biotic and abiotic factors on plant functions and crop productivity. In such studies, generally green house grown plants in pot are utilized without realization of real field situation. It is a known fact that in naturally lit screen houses, there is about 30-40% reduction in incident radiation, high humidity and limited soil volume in pots, and thus, the potted plants are relatively weak as compared to field grown plants. Reports in literature indicate substantial differences in crop responses to drought and salinity stresses between pot grown and field grown plants. With limited soil volume and high root density in pots, there is rapid development of plant water deficit and plants have very little time of adapting under such rapid drying conditions. It also generally happens that the plants with strong root system, which have a greater chance of survival and yield better under field conditions, are usually poor performers under pot conditions. Similarly, the pattern of salt distribution in soil under pot and field conditions could be different simply because of differences in the frequency and quantity of watering under two situations.

Similarly, one should be very cautious while interpreting the response of transpiration or photosynthesis to environmental factors recorded on individual leaf and whole crop canopy under field conditions depending upon variations in water use efficiency and harvest index. Thus, we have to reorient our research and education programme in the discipline of plant physiology to make it production physiology and following areas would require strengthening/farming of new courses at PG level.

- Crop physiology
- Internal plant water status and crop productivity
- Crop modeling
- Root morphology and physiology in relation to input use efficiency in field crops
- Identification of potential stress tolerance traits in crop cultivars

f) Yield potential and its stability

In the past century the pace of varietal development in different crops has been quite encouraging. The new vistas in Indian agriculture were added in the form of Green Revolution by the introduction and development of high yielding dwarf varieties of wheat and rice, and development of a few hybrids of other

crops, but now yield plateau has been observed in major food grains like wheat and rice even under high input system of agriculture. Thus, breakthrough in crop improvement programme may come by improving the partitioning of biomass towards useful components from whole plant (root and shoot) rather than shoot alone. Heterosis or hybrid vigour has been exploited in several crops and a considerable scope exists to increase the productivity of crops through heterosis exploitation.

The important constraints facing the Indian agriculture production system indicates that sustainability under rainfed conditions is perhaps the key issue for India. In recent past, there has been a modest progress to incorporate the traits for biotic resistance into suitable agronomic background. However, only very little efforts are made to identify and incorporate the potential traits for different abiotic stresses into high yielding varieties of field crops.

With the fast technological developments, the progress in system physiology has opened new possibilities in identifying potential traits to various environmental stresses and their measurements by relatively simple and impressive means. Recent time has also witnessed an exponential increase in understanding the molecular biology of stress tolerance in plants. The knowledge gathered in the field of stress physiology and biotechnology could permit us to incorporate desired traits through improved breeding technologies to achieve a second green revolution in the country.

There is now an emerging consensus regarding the desirability of the farmers' participation in the development and release of variety, particularly for the unfavourable environments. The institutional system of plant breeding and seed productions have been benefited enormously from the genetic diversity of the difficult regions. Now it is time that plant breeding strategies are broadened, recognizing comparative advantage of farmers and plant breeders, to reconcile on often conflicting objectives of equity, sustainability and efficiency. It is recognized that 20-25% yield advantage may be achieved only through the use of good quality seed. In this endeavour, the SAUs, ICAR institutions and other organizations have geared up their breeder-, foundation- and certified seed production programmes to enhance the availability of good quality seeds to the farmers. These and several other above mentioned issues need special consideration while strengthening / framing of new courses at PG level in the discipline of genetics and plant breeding. The areas which need strengthening the teaching programme in the discipline of crop improvement should include:

- Biotechnology and genetic engineering
- Farmers' participatory plant breeding
- Breeding for biotic and abiotic stresses
- Management and conservation of plant genetic resources
- Seed technology
- Intellectual property, breeders' and farmers' right in patenting of seeds, other life forms and biobased products

g) Atmospheric environment

Modern agriculture requires precise information on various agro-climatic parameters for harnessing maximum benefits from atmospheric factors by suggesting suitable agro-technology and corrective measures against aberrant weather conditions for sustained development of agriculture. This would require delineation of agro climatic zones by proper inventory of edaphic and weather parameters, availability of other resources and prevailing cropping systems. It will help not only to intensify the execution of the concept of efficient

crop zoning by producing a particular crop commodity in the ecologically optimum zone but also timely warning systems for taking necessary corrective measures against aberrant weather conditions, pest's and diseases. The use of remote sensing techniques in resource monitoring and crop-weather modeling for resource optimization should be advocated to modernize the discipline of agricultural meteorology. These areas should find proper place in PG course curricula to train our graduates in this important discipline. The courses which need strengthening / inclusion in this field include:

- Crop weather forecasting
- Agro-climatic zonation
- Crop weather modeling
- Application of remote sensing techniques in agriculture
- Climatic change, green house effects and Indian agriculture

h) Post harvest technology and value added products

There is great scope to augment farmers' income and avenues for employment by proper allocation of resources to an array of options; i.e. proper packing and grading of fruits, vegetables, spices, and cut flowers and preparation/manufacturing of several value added through post harvest technology for their proper marketing within and outside the country. The subject is particularly important to the disciplines of horticulture, vegetables, agro forestry and other allied branches. The PG course curricula which need strengthening should include the following areas:

- Post harvest physiology of fruits and vegetables
- Storage, packaging and marketing of seedlings and cut flowers
- Post harvest technology and value added products of field-tree and vegetable crops
- Spices, condiments and medicinal plants

i) Agribusiness Management

The spectacular success achieved by our neighbouring Asian countries such as Japan, South Korea, Taiwan, Thailand, Malaysia and China in the field of agro-industries and agro-business has positively inspired our planners and also the corporate sector to view agriculture in an entirely new light. The current level of export is very meager, but the speed at which the exports are growing is satisfactory. There can be no doubt about the immense and yet untapped prospects and potentials to view and convert India as an agricultural power. There are positive indications in this direction. Food crops, plantation crops, poultry, dairy, sugar, cotton and oilseed are the areas in which India has made its mark. Sericulture, marine and inland fisheries are other areas in which considerable progress has been made. Only a few countries grow such a wide range of fruits, vegetables and flowers and rich variety of medicinal plants and herbs as India. India can also attain a commanding position in developing and extending world wide benefits of biological software comprising of highly promising and relatively inexpensive vermiculture, bio-fertilizers, bio-pesticides, tissue culture propagated materials, nitrogen fixing shrubs and trees. India is the leading producer of tea, coffee, cashewnuts, spices and jute fibre. With proper planning and production of greater exportable quality surplus, India can certainly emerge as a modest player in the global market of agricultural products. However, this will require proper linkages between agriculture and industry through strengthening the agricultural business management education in India.

A few SAUs have taken a lead in identifying this need and decided to extend their education services to prepare competent personnel for careers in teaching, research and consultancy in agri-business oriented enterprises. A proper education and training to the farmers is also required in the changing scenario. A few State Governments and Chamber of Commerce in collaboration with SAUs are eager to set up marketing intelligence system for providing information on national and international marketing trends and systems about agro-based produce/products for the benefit of farmers. There should be a great deal of involvement of several rural development and financial agencies to help the agro-industries and farmers in this endeavour.

Keeping in view the above problems and objectives, there is an urgent need to strengthen the existing or frame new courses in SAUs at PG level in the following areas to make agriculture business oriented enterprise.

- Management of Agro-industrial projects
- Costing and pricing problems in agriculture
- Small business organization and management
- Marketing research and information system for agro-industrial projects

Self-motivation, effective communication skill, meaningful professional qualities, quantitative and good management skill alongwith computer literacy are the desirable qualities of 21st century graduates. Need based strengthening of PG education can inculcate the desired qualities among the agricultural graduates to develop professionals by building academic brilliance and professional excellence.

Employment Orientation to Agriculture Education

H. U. Khan

*Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu
Railway Road, Jammu (J&K)*

Agriculture is a source of perpetual creation on which the human civilization has developed. Agriculture education has provided solid technical foundation for the development of civilization. The Indian economy, which is predominantly agrarian dependent, employs about two-third of its labour force to agriculture sector. Thus, realizing the importance of agriculture, the nation has focused special attention in establishment of an effective agricultural education system for development of the human resource in agriculture sector.

Historical Perspective of Indian Agriculture Education

The Agriculture education in India started way back in 1877 with the establishment of first agricultural school at Saidapet in Madras. The organized planning in agricultural education began with the constitution of Indo-American study team headed by K.R. Damle (1955) & M.S. Randhawa (1959) followed by the Agricultural University committee (1960) headed by Dr. Raleigh W. Cummings, which recommended the establishment of agricultural universities in India.

Agricultural Education System in India

Agriculture education in India is offered by two different systems viz., 200 academic units (169 colleges & 31 agricultural schools) in 32 State Agricultural Universities, 11 colleges in 9 Central / Deemed Universities, 39 colleges in 17 general universities. Annually about 12,000 farm graduates pass out through the Indian agriculture education system to shoulder the responsibilities of Indian agriculture. However, the SAUs are contributing major share towards the production of farm graduates and are strong centers for agricultural research and extension education in the country. The SAUs have by and large organizational and structural uniformity as they are established on a common model of Land Grant Pattern. The SAUs have a strong educational system with student teacher ratio in the range of 5-8 in comparison to Non- SAUs where the student teacher ratio is higher and in the range of 10-20. A low student teacher ratio is a must for SAUs in lieu of multi - disciplinary nature of agricultural research and education being imparted to students in comparison to Non-SAU institutes where mono activity of teaching is being followed. With the strong agricultural education system the country as on today has large band of well-informed agricultural scientists and development professionals trained within the country engaged in the nation-building programme. These men & women along with the farming community of country with strongly inter- woven agricultural education system have helped the country to free itself from the clutches of perpetual famine and food imports to emerge as a proud nation with self sufficiency in record time. The country has made appreciable achievements through Green revolution, White revolution, Blue revolution and is heading towards the attainment of Yellow revolution.

Post independence priorities of Indian Agricultural Education System

The country possesses an effective and large agricultural research and educational infrastructure. The Indian agricultural education system since independence had variant priorities which are given I Table 1.

Table 1. Priorities of Indian agriculture education system since independence

Period	Priorities to Indian Agriculture Education System
Sixties	□ Increased food production for management of famine & supply of raw materials
Seventies	❖ Self sufficiency in food grain production ❖ Effective food grain distribution / managementv Resilience in food grain production
Eighties	• Diversification • Poverty alleviation & Rural employment generation • Food & nutritional security
Nineties	➤ Sustainability ➤ Post harvest management & value addition ➤ Food & Nutritional security ➤ Food safety
21 st century	▪ Natural Resource management ▪ Farm mechanization ▪ Quality Export & integration with World trade

Occupational Structure of Farm Graduates

The annual turn-out of farm graduates is about 12,000 through Indian agriculture education system and the distribution of trained manpower is as enumerated in Table 2 Below:

Table 2. Distribution of farm graduates in different sectors in India

Sector	Per cent share	
	Agriculture	Veterinary
Services	46.4	76.3
Agriculture	27.8	17.7
Trade & Commerce	18.6	1.1
Manufacturing	5.1	2.9
Other sectors	2.1	2.0
Total	100	100

Based upon the employment distribution about 46 % from the agriculture & 76% from the veterinary sector are getting in to the state service sector. The incidence of unemployment in agricultural sector was relatively low till recently in comparison to other sectors because of the availability of protective job markets. Up-to eighties, agricultural education was supply-driven and there was huge & expanding demand for the trained manpower for research & development in the public sector. In the private sector, there was also

continuous demand for graduates from the input sectors including banking & crop insurance companies. Availability of adequate number of graduates & not the quality was key concern. The situation has changed vastly now, the public sector as well as private sector are saturated with the manpower and demand to fill the available vacancies is anticipated to be marginal. The agricultural education system to be effective has to adjust & respond appropriately ahead of time to the changing environment. Obviously the agricultural education system has to adjust to the demand-driven situation.

REORIENTATION OF AGRICULTURE EDUCATION SYSTEM

The socio-economic scenario of the country & the world are changing fast and would continue to change at faster rate in future also. The traditional & subsistence Indian agriculture has attained the status of commercial agriculture. Commercial agriculture needs more investment, high technology & various inputs like seeds, fertilizers, pesticides & high technologies etc. The independent farmer of yesterday is more dependent upon many players than before. The farmer under commercial agriculture is dependant upon neighbors, progressive farmers, relatives, extension agencies, input dealers of seeds, fertilizers, pesticides, weedicides and machinery as besides laborer for work, middlemen for selling, banks for credits, government for supportive policy and nature for good production. With the signing of GATT & WTA, the commercial agriculture calls for specialized but cost-competitive production, post harvest management / processing, transportation, storage, packaging, labeling and positioning of products at domestic & international market.

Agricultural production has assumed different priorities and is not dependent upon grain production only. To produce more marketable surplus to earn more profits and to meet the demands of diversified needs of modernized agriculture is the driving force of agriculture.

The traditional job markets have shrunken and new favourable trends for job opportunities are coming up in new areas. There is steady growth in national economy population is increasing & demand for agricultural produce is growing; food habits & life style are changing. There is greater demand for protective food and, with globalization of economy, greater potential for export markets have opened up. Both the production and processing activities in the private sector would need increasingly competent manpower. The Indian agricultural education system has to reorient itself putting emphasis on principles of ecology, gender and social equity, economics & employment generation.

The farm graduates have to be groomed to meet the challenges of sustainable agriculture and food security. They have to be trained in science & art of sustainable agriculture and agribusiness so as to take farming & agribusiness as a viable economic enterprise. The mission of present Indian Agriculture Education system is to equip men & women to take career of self-employment. For this shift in the curriculum has to be brought about to produce skilled and problem-solving graduates. Promotion of excellence in the frontier areas of newer sciences i.e. biotechnology, information technology, geographic information system, patent & trade literacy, computer efficiency & sensitiveness to socio-economic conditions have to be encouraged to meet the future challenges. Strenuous efforts need to be made to attune agricultural curriculum not only to meet the present needs but also future demands so that we have first rate manpower with capabilities of delivering the goods. For Indian agricultural system to be self-supporting and employment-generative under the present liberalization, privatization and globalization, some of the key issues which require immediate attention and orientation are:

Global Competitiveness

For capturing the global markets in farm commodities & employment opportunities, the farm graduates have to be given extensive courses on international agriculture, world trade agreement, trade related intellectual

property rights, global conventions, climate biodiversity & desertification. They have to become familiar with international standards like ISO-9000 & ISO-14000.

The farm graduates have to become literate in computers, patent and trade literacy so that they can capture the global markets for farm commodities. International agriculture, TRIPS and implication of World Trade Agreement should be made versatile topics for the farm education.

End-to-End Approach

Indian agricultural education system should enable the farm graduates to undertake agricultural intensification, diversification and value addition in an integrated manner. The graduates should become job-providers and not remain only as jobseekers. They have to be trained to generate more skills on farm & non-farm livelihoods. This requires end-to-end technology mission approach i.e. linking production & post harvest technology in a mutually reinforcing manner.

Agricultural Technology Parks

The agricultural technology parks should be established at Agricultural Education Centers. This will establish the economic viability of new technologies. These parks could promote technology incubation and dissemination. Such parks, linked to appropriate public & private sector enterprises from the point of view of marketing arrangement, will help to enhance the self confidence of farm graduates & stimulate them to take career of self employment.

Harnessing Frontier Sciences & Technologies

For promotion of excellence in agriculture sector the SAUs have to review their policies in order to retain the outstanding scientists in the areas of biotechnology, information technology, renewable energy management, agriculture economics & agribusiness management for promotion of excellence.

Strengthening Partnerships

Future challenges can be encountered by building partnerships between different organizations and not working in isolation. Some of the partnerships, which have to come up are: among SAUs, between SAUs & women & rural institutes, between SAUs & general universities, CSIR, ICAR, & other research institutes, between SAUs & private & public sector industries, between Agricultural scientists & farm families, and also between SAUs & ICAR institutes and International agricultural research centers.

These partnerships require suitable memoranda of understanding & will promote the field of result jointly with the farm families. Such participatory culture or research is essential for integrating ecological & social sustainability in new technologies. Sustainable agriculture requires location-specific technology & can be achieved by adopting double or triple helix models of partnerships.

Human Resource Development

The emphasis has to be put on the teachers training & re-training. The normal tendency has been of changing the syllabus with the competence of teachers remaining same. It is important that the teachers are continuously updated and skills upgraded so that they can inspire students in promoting the cause of sustainable agriculture & rural development. There is scope of utilizing series of emeritus scientists & retired professionals. In science the experience, which grows with age, can be an asset for new generations. Moreover, the retired scientists may be in a position to work & teach in regions which are economically & ecologically under-privileged. Thus, the method to utilize the Brain & Skill bank should be effectively evolved.

Natural Resource Management

The country has well spread Panchyat network across the country incorporating the representative members from various sections of society. The programme for training of Panchyat members should be developed laying emphasis on the sustainable management of ground water & ensuring the security of soil health. The village common property resources need to be developed. The female members of the Panchyats can be empowered for the natural resource management through participatory & peripatetic training programmes. By providing high priority to knowledge & skill empowerment of Panchyat members, the vision of Mahatma Gandhi's Gram Sawaraj could be accomplished.

Farm System Management

For promoting the sustainable agricultural practices and realizing the impact of farming system, it is mandatory to include agriculture / horticulture / animal husbandry, fisheries & forestry along with the major courses in the Agricultural education system. The reason being the farming system in the country is mixed farming with farmers adopting integrating of crop, livestock, fish, horticulture & forestry. The farm training should be farm system based. Although few states are possessing separate horticulture, veterinary and agricultural universities, the efforts should be made to have better partnerships for providing joint training on farm system management & research. Further disintegration of farm education should be restricted.

User's Orientation to Agricultural Education

In accordance with the aptitude and needs of farm graduates, selection should be made right at the beginning of education programme. The students need to be groomed along their field of interest. This provides a better opportunity for learning & performance in a better way by the trained person in real life like situations.

Non-degree training Programmes

Non-degree training programmes based on market preferences & needs for the up-gradation of skills of in-service candidates drawn from education, research institutes & extension departments need to be initiated by the SAUs. These courses offer life long education & learning opportunity.

Computer-aided Extension Education*

Precision farming is knowledge intensive. Modern information technology provides opportunity for reaching the unreached in terms of information & technology empowerment. Distance learning methodology can also be widely used & linked with the interactive modes of extension at field levels.

Manpower Planning

Assessing the human resource requirement in advance would facilitate sound investment decisions in agricultural education. To promote the need-based growth & prevent the wastage of resources, the knowledge of a number of trained manpower and skill mix requirement in public and private sectors would be of great value. This area requires to be looked for short term and long term perspectives. In the long term, the aim should be to have at least one farm graduate available to each Panchyat and Nagar Palika to serve as multi-purpose farm consultant. Initially, they can work whole time or part time depending upon needs & circumstances. As sustainable agriculture is highly knowledge-intensive, it is important that in long term all Gram Panchyats / Mandals / Zila Parishads have at least one agriculture consultant on a regular basis. The estimates of requirement of farm graduates should be taken as a base for the admission policy.

At present, there is high degree of regional variation in the availability of trained farm graduates. While deciding the priorities of future agriculture education, such regional disparities should be kept in mind and the provision of regularly upgrading the knowledge & skills of these graduates should be given due considerations.

Distance Education

There are large dropouts in rural schools and a major segment of rural population is still unreached so far as new agricultural technologies are concerned. ICAR & SAUs should come up to train such youth by way of distance education. The aim should be to reach the unreached particularly women. This will lead to adoption of new technologies, leading to higher productivity without ecological harms. For this the establishment of independent cell for distance education has to be ensured. A full fledged media center is to be established for developing the capsules for dissemination of knowledge in agriculture & allied sciences through television and use of multimedia as a part of distance education programme.

Improvisation of Private Agriculture Colleges

Many private colleges & institutes outside SAUs are also offering the agricultural education. These institutes do not have adequate infrastructure & facilities to impart practical skills & training. There is need for improvement of educational standards by these colleges. For enforcing the structural changes, it is important to provide some developmental grant for improvement of library, laboratory, equipments and farms and for the establishment of educational technology cell. These colleges need to be assessed for their potential. Those which do not have minimum infrastructure need to be closed, while others could be supported or brought into mainstream.

Social relevance of agriculture

The present educational policy does not address the issue of social relevance in totality. Issues like poverty, gender inequity, malnutrition, sustainability & regional imbalances fall in this category. The curriculum must cover these areas to substantially focus on economics, equity, agribusiness, agricultural marketing, value addition, international trade & other related disciplines. The agricultural education has to come out of its mould of rigid framework and has to take on the roll of continuing education where education process is adjusted to the needs of illiterate, unskilled farmers & farm households. This implies that individual farmer should have access to agricultural education facilities at different stages of his / her life, and educational process has to be more directly related to local conditions and be more socially relevant.

To be efficient & effective, Indian agriculture education system has to introduce changes in agricultural research & education to make it competitive & commercially oriented in the changed worldwide perspective. The agricultural education has to cater to the needs of illiterate, unskilled farmers, commercial agriculture, and international agribusiness. The challenges before the Indian agriculture i.e., food for growing population, environment sustainability, competitiveness in the international market for safe and steady economic growth are mammoth tasks. These challenges can be safely overcome by mobilization of agricultural education force in the sustained agricultural growth for the prosperity of nation. It has been observed that wherever there is satisfactory agricultural progress there is alleviation of poverty and increased livelihood security. It is true in the sense that agriculture education links student's skills, aptitudes and abilities with the careers in food, fiber and natural resource industries and provides a win / win equation to farm graduates and nation.



Delegate Vice-Chancellors participating in discussions at the Convention

DISCUSSIONS

Initiating the discussion, Dr. Parmatma Singh, Vice-Chancellor, RAU, Bikaner, emphasized the need to keep into account the specific requirements of employers and to orient the instructional programme to enable SAUs produce graduates with requisite skills. Specialized courses of one-year duration can also be initiated and the students equipped with complete professional skills and expertise to embark upon their own entrepreneurship, thus becoming job providers rather than job seekers. Dr. B.S. Chundawat, Vice-Chancellor, SKDAU, Gujarat, remarked that the public sector is completely saturated and can not further absorb our graduates. He said that job opportunities exist in ventures such as post harvest technology and value addition, commercial farming, contract farming, mixed farming, horticulture, dairy and live stock husbandry. Dr Nagendra Sharma, Director NDRI, Karnal cautioned that changes in course curricula occurring with change in the governments is likely to adversely affect our performance and should not be allowed to happen. Dr. R.P. Singh, Executive Secretary, IAU, informed that about 80% of the consumer price of agricultural products goes to middlemen, and working out ways and means so that our graduates work like middlemen can not only solve the unemployment but also facilitate timely and effective supply of inputs and disposal of end products. Dr. S.S. Baghel, Vice-Chancellor, CAU, Imphal, remarked that field work and practicals are the casualty in faculties, and excellent faculty and infrastructure are the pre-requisites for better results. He desired that ICAR should commission a study to see how the teachers could be motivated laying more emphasis on field and practical work and skill development in students. Participating in the discussion, Dr J.C. Katyal, DDG (Education) ICAR, remarked that already much has been said on these aspects in NAAS and ICAR –VC's conferences, and that it is time to focus on better future strategies and orient educational system keeping in view employability and not employment. Summing up the discussion, Dr. Managla Rai, Director General, ICAR and Secretary DARE (Chairman of the session) remarked that we should address the issue relating to agriculture in changing global scenario and prefer 'employability' to employment categorizing it into *service providers, science and technology careers and entrepreneurship*. He said that it is high time we identify the niches and address them with suitable academic curricula. He agreed that practicals and field trainings in SAUs have become a casualty, which has to be immediately addressed. He assured that ICAR would support studying on core issues.

Following recommendations emerged after thorough discussions:-

- Present mind-set of graduates of agriculture and allied fields towards seeking employment needs to be diverted to employability and self-employment. Agriculture education should prepare students in knowledge and skills capable of converting rural based strategic opportunities into employment, addressing all its facets.
- SAUs' faculty should upgrade itself with communication technology, agri-business, post harvest technology and agro-processing activities, education methodology, e-learning and entrepreneurship in respective field, and the opportunities created to train and upgrade competence.
- Employment opportunities are shrinking in public sector. On the other hand, employment in private sector is growing. Agricultural graduates naturally should be developed with skills, self-competence and self-confidence, with spirit of continued learning. Hence agricultural education be revitalized and re-engineered to meet the demand-driven private sector requirements of specialized skills of biotechnology, information, mechanization, automation, post harvest technology and value addition, e-commerce and e-learning while simultaneously moulding the minds of students away from white-collared jobs towards entrepreneurship and scientific farming.

- Every SAU should try to harness agro-climatic niche by devising specialized courses and expertise in production, processing, packaging and marketing of niche crops and commodities and acquire capacities to become Centres of Excellence for identified niche crops.
- It is necessary to include animal husbandry, fisheries and forestry and agri-business along- with the major courses in agriculture education system in order to enable agricultural graduates think for diversified agriculture and to enable them help the farmers who practise mixed farming.
- Activities, that have created employment, should be identified, documented and education imparted in these areas. Non-degree training programmes based on market preference and local requirements could be instituted.
- Central / State governments be requested to provide, soft loans to graduates in all disciplines of agricultural science (Agriculture, Horticulture, Forestry, Fisheries, Agric. Engineering, Veterinary, Home Sciences etc.) for promotion of self employment on the lines of NAAS recommendations. Women employment in post-harvest technology could also be considered.
- Only agricultural graduates should be authorized to deal in sales and supplies of agricultural inputs such as fertilizers, pesticides, seeds and planting material, farm machinery etc.
- SAUs should be equipped to train through distance education the rural school dropouts so as to reach the un-reached especially women leading to adoption of new technologies resulting in higher productivity in ecologically sustainable manner in agri-business, agro- servicing etc.

TECHNICAL SESSION - II

Pros and Cons of Private Agricultural Education in India – A special Reference to Chhattisgarh State

C.R. Hazra

Indira Gandhi Agricultural University, Raipur (CG) 492 006

The education system of any country, as much as of India, is a composite system comprising primary, secondary, tertiary and professional education. Each segment has its own importance, though these are interrelated. One needs to take a more comprehensive view of the education system as a whole, with inter-structural linkages. Besides, one must appreciate the inter-dependence of various levels of education as also recognize that it is the quality of higher education that determines the quality of teachers for the primary, secondary as well as higher education institutions; similarly, it is the quality of primary and secondary education that determines the quality of students in higher education.

Despite the large mass of illiteracy and a large proportion of people still below the poverty line, India's competitive edge-particularly in science and technology that is steadily transforming human life – is further reinforced by the contribution of the manpower produced by higher education. The challenge today is a different and complicated than it used to be some years back. Our internal comparison of quality, the comparison between one university with another, is not enough anymore. The WTO, GATS, IPR and other such instruments and modalities stare at our face. The new challenge is qualitatively different. Quality assurance in higher education has become the prime concern of not only an institution and particular nation but also of the whole Universe. Throughout the world, universities and colleges today are focusing special attention on designing and implementing new quality assurance mechanisms and systems in order to ensure that students receive high quality and relevant education and that degrees and diplomas are widely recognized. Such recognition is seen to be essential not only by national governments and employers but also by other universities and employers internationally.

Indian Higher Education

India has the second largest higher education system in the world, the third largest pool of skilled persons. There are about 304 universities in India, which include 62 deemed universities and 11 open universities. There are about 14,600 colleges with about 5 lakh University teachers. Even with such a huge number of colleges and universities, the students going for higher education after high school is about 7 per cent only. This figure is very disappointing when compared to even small developing countries like Korea, Indonesia, Vietnam, Thailand etc., our South-east Asian neighbours. The reasons are many and the primary most are the population and poverty. The families below poverty line or even middle class families are unable to send their children for higher education in a distant place from their village or town as it involves a considerable expenditure. They prefer to send them in a local college irrespective of the standard of teaching due to financial problem.

Here comes the importance of private colleges for higher education. India has a long tradition of private colleges and good examples are the age-old *gurukuls*. The privatization of higher education started in the decade of nineties. At that time the budget provision for public sector institutions shrank drastically. As a consequence private colleges came into existence with the name "self financing colleges". But the fees these private colleges take is very high. As a result the Supreme Court in 1992 banned high-fee taking colleges

stating that capitation fees is patently unreasonable, unfair and unjust. But again in 1993 the Supreme Court judgment opened vistas for private colleges as 'self financing' colleges.

In this way the privatization of higher education was opened in medical and engineering colleges. In 1991 there were 303 private financing medical colleges as against 25 government private colleges. Similarly, there were 95 private engineering colleges in Andhra Pradesh in 1991 as compared to 11 government colleges. Earlier charity, social service were the main aims of private education institution. But now it is not true. Though some organizers still carry on the private institutions with the objective of philanthropy, charity and social service but many of them, no longer follow this and commercialization of education is their prime objective.

Privatization of Agricultural Education-the Needs

In India as mentioned earlier, the percentage of students attending the higher education is around 7 per cent. Out of this, the students going to agricultural side including animal husbandry, agricultural engineering, dairy technology and home science are less than 2 per cent. Also, there is a vast variation in different states. In Chhattisgarh state with more than 80 per cent population depending upon agriculture, only about 0.4 per cent of the students go for higher education in agriculture.

If we assess the reason for not going to agricultural sector, the answer is simply accessibility. Till 2000 there was only one agricultural college in the entire state situated at Raipur. Students belonging to economically backward, and mostly tribals and scheduled caste people were unable to send their children to distant places, keep them in hostels and educate them. On the other hand they admit their children in a local college to study B.A. or B.Com. These boys after getting their degrees in arts or commerce go to their villages and involve in agriculture, as there is acute unemployment. The girl students who go in for agriculture were very less at that time, if they get a degree they settle as house wives, in case they do not get a suitable job

The government of newly formed state in 2000 thought that a boy who studies the territorial area of Emperor Akbar or the fate of Aurangzeb just forgets his knowledge and involves in agriculture. Instead if the student get access for agriculture education instead of arts or commerce he can utilize his knowledge of how much nitrogen in urea and how much phosphorus in super phosphate etc.

With this view, the then government decided to provide access to higher education for the tribal and other backward classes who live in interior and far away places and decided to open the higher education in agricultural colleges to private sector. Initially the government decided that at least one college should be there in each district.

With this view the government decided to invite private sector for higher education in agriculture. But the university act does not permit affiliated colleges. The Act permits only constituent colleges. As a result, it was decided to convert the zonal and regional research stations situated at Jagdalpur, Ambikapur and Bilsapur as agricultural colleges. With this decision three more agricultural colleges came into existence in September 2001 in Chhattisgarh totaling 4 government agricultural colleges in the state. But the government thought that these would not be sufficient and University Act does not permit private colleges to be affiliated to the agricultural university. Then the government made amendments in the university. Act by passing a bill in the Legislative Assembly and brought private colleges in the jurisdiction of the agricultural university. Besides agricultural degrees, the amendments in the university Act made provision for diploma courses, distance education as well as vocation courses under the purview of the agricultural University.

Now in the University there are 4 agricultural colleges as constituent colleges and 17 private colleges. Of these 17 private colleges, 10 are Agricultural colleges, 4 are Horticulture Colleges, one is Agricultural Biotechnology College and 2 are Agricultural Engineering Colleges. Some of these colleges started in 2001-02 and some in 2002-03. After having 2-3 years of experience dealing with the private colleges, several problems were observed initially. The prospects of these colleges would be seen only after a year or two based on the results, thrust for PG programme and competition for employment. Relative strengths and weaknesses of privatizing the agricultural education are assessed and some of them are mentioned in subsequent paras.

Strengths of Private Agricultural Colleges

1. Privatization of agricultural education and opening of colleges in different remote areas made access to many tribal students who otherwise could have either dropped at school level or might have opted for arts or commerce subjects that are easily accessible to them.
2. It is not very correct that all the private colleges are solely commercialized and they do not bother for quality. Many of the private colleges in India are ranked first among the top ten in the country. But the fate of these private colleges can be assessed only after the first batch of students comes out.
3. In the present days of financial crunch in all sectors, expanding higher education in government sector is practically impossible. Investments from private sectors are desirable to the extent possible.
4. The committee constituted by Government of India consisting of two prominent industrialists, Shri. Mukhesh Ambani and Shri. Kumaramangalm Birla has submitted a report to the government on privatization of higher education. The committee strongly suggested that government should leave higher education altogether to the private sector and confine itself to elementary and secondary education.

Weaknesses of Private Agricultural Colleges

- I. The main fear in privatization of agricultural education in the country is the quality. Unlike other professional colleges, agricultural colleges should have at least 50 acres of land for conducting practical and demonstrations of agro-technologies.
- II. The second doubt that comes in the mind is the quality of teachers. Most of the private colleges do engage freshly passed graduates to conduct classes without any experience. In some colleges, they hire PG students from the constituent colleges to teach the UG students in their colleges. The PG students, for the necessity of funds for their studies, accept the offers and take home the petty amount paid by them.
- III. The main problem that is seen in private colleges is conduction of practical examination. Many of the colleges do not appoint qualified persons for courses like biotechnology, biochemistry, agrometerology etc. and they ask other teachers to teach these subjects. As a result they are unable to conduct the practical examinations.
- IV. There are controversies about the fee structure too. The fee structure of private colleges is higher than the constituent colleges. As a result, some feel that they are minting money. But it is not true. These are self-financing colleges without any financial support from the government, whereas the constituent colleges get grants from the government. So it is practically impossible for the private colleges to bring the fee structure at par with Government colleges. But there is a big loophole here. The Government pays full tuition fees to the SC and ST students and to some OBC students with some income limit of the

parents. Hence, some of the private colleges admit SC, ST and OBC students from remote villages by saying to them that they provide scholarship for day-to-day expenses. As a result some students join the course without any interest, but the colleges collect their higher fees from the government.

- V. Another point to be noted here is that in government colleges if the parents are transferred from one town to another, the students also get transferred in the constituent colleges. But in private colleges they do not allow the students to get transferred as it involves reduction in income for them. They lose the tuition fees from them. Because of this, many students struggle as their parents are transferred and they cannot afford to pay for hostels.
- VI. Even if a student joins a private college and if he gets admission in Government College, the private college management asks him to deposit entire fee for four years to get a TC and other certificates to join the Government college. A number of students suffer from this business-minded approach.
- VII. It is also difficult for the university to control and oversee quality education in the private colleges. There is a good amount of management problem at the university level for overseeing the activities of these colleges because of non-availability of manpower at the university.

There are some more problems with the private colleges which are not common but pertain to one or two colleges.

What is the solution?

Looking into this, it is necessary to provide access to poor students in remote areas to go for higher education in agriculture through private colleges. But the way private colleges run the show to earn money is so bad that it is difficult to allow them to continue. For improving the quality of agricultural education in private colleges it is necessary to take care of the following issues:

- I. Scrutinise thoroughly the capability of the organization for running the college with adequate infrastructure. There should not be any compromise with the promises they make.
- II. The required manpower with qualified teachers with similar pay structure should strictly be adhered to. Teaching of one subject like Soil Science by an Extension person should be condemned and the recognition to the college should be withdrawn.
- III. The examinations should be centralized, as has been done at IGAU and no scope for any malpractice should be left.
- IV. Admission in the first year should be allowed for a small period of 15-25 days. That is no desire on the part of some private colleges to maintain and improve upon the quality; it is sheer greed for money just like other business enterprises harming the education system in the country. The university should be very strict in this and admission list should be sent to the university within a week of completion of admission as stipulated by the university.
- V. The practical examination should not be allowed to be conducted without proper laboratories.

These are the problems, which were faced in the state of Chhattisgarh due to privatization of agricultural education. But if good societies take up higher education in agriculture, there may be more advantages rather than the pit-holes. Agricultural Universities may refrain from affiliating colleges. The affiliation may be taken from general/traditional universities as is practiced in some of the states.

With this experience of privatization of agricultural education in Chhattisgarh state, some pros and cons are assessed which are given in given in Table.

Table: Pros and cons of privatization of higher education in agriculture

S.No.	Pros	Cons
1.	Government cannot provide higher education in agriculture in remote towns and tehsil headquarters. Only private sector can establish colleges in remote towns	Private colleges, if not scrutinized properly before giving approval, may become a problem from quality and also from administrative point of view. If the society or organization is money minded, it would be difficult to control them.
2.	Some of the private colleges and universities are doing excellent jobs and students are attracted to these colleges (not in agriculture) in spite of higher fee structures because of quality and career. If good society or organization takes up higher education in agriculture, they may and can do better.	Higher education in agriculture involves more field oriented practical work and the private colleges need to maintain a good farm. If they lack in this, the students suffer.
3.	In most of the universities, the quality of teachers is degrading because of political and social compulsion to recruit sons of the soils. But the private organizations can bring quality persons from anywhere.	Because of the freedom of recruitment they recruit persons of their choice without following the government norms like reservations etc. Also, they recruit persons without proper scrutiny or interview.
4.	Private colleges can afford to equip their lab with quality equipment and infrastructure, whereas in the SAUs the comparative rates are more important than the quality. In this way private colleges can establish good laboratories.	For saving money they may equip the labs with sub-standard equipments out of limited money without assessing the needs and quality. Such approach may degrade the quality.
5.	Private colleges can organize extra classes and involve students in productive activities, while in government colleges all the rules are to be followed including labour laws.	Private colleges allow students to appear in examinations without attendance and without attending practicals. As a result, the students do not get good exposure and they become unemployed due to lack of quality.

There are, thus some advantages and also disadvantages in privatizing the agricultural education. In fact, all the SAUs are involved in teaching, research and extension. But these private colleges are involved in teaching only. They must get themselves involved in research and extension activities too, so that they can cater the need of poor farmers, mostly tribals and harijans. There is an earnest need for good quality education in private colleges. Stringent laws and rules should be framed, and the university administration should have the right to de-recognizing these colleges which do not meet the minimal set requirements. As I understand, Maharashtra State has also followed the suit of Chhattisgarh by opening about 35 new colleges, all are affiliated to SAUs. Considering all the aspects in favour and against the privatization of agricultural education in India and their the affiliation by SAUs I strongly feel that the private colleges should not be affiliated by the State Agricultural Universities so that the very basic objectives of establishing the SAUs are not defeated. ICAR, being the controller of NARSE, may take initiative to persuade the State governments in this direction. To maintain the sanctity and quality of agricultural education in India, which also include research and extension, privatization of agricultural education through SAUs be discouraged.

Privatization of Agricultural Education

V.M. Pawar, P.S. Borikar and S.D. Wangokar
MAU, Maharashtra

Privatization in different spheres of life has become order of the day in 21st century. Privatizations of different boards/corporations are now witnessed in a big way. This has also entered into the kingdom of education. India being a nation dominated by agriculture and agriculturists, is sine quanon to widen the horizons of agricultural education to extend its maximum benefit to the students hailing from rural areas. Despite consistent and persistent efforts put in by the government, the government at the Central and the State level have inherent limitations of requisite resources and finance. On the other side, the number of aspirants longing for higher agricultural education are also on the rise. Moreover, to bring about substantial development in the realm of agriculture and related fields, it is also imperative to add to the institutes of higher learning in agriculture. To cater to this dire need and in the light of other veracities forestated, it is wise and essential to entrust this responsibility of imparting higher level agricultural education to the competent private institutes without any drop of government assistance. Green signaling of agricultural education in private sector on the lines of traditional higher and medical education seems to be better alternative.

Privatization of higher traditional and medical education is being successfully implemented. This has given ample opportunities to enormous students to undergo college education in engineering and medical sciences and have facilitated to enter into services, professions at national and international levels leading to the generation of ready and easy employment and self employment. In comparison with arts, commerce, science, engineering and medical colleges, the capacity to admit the eligible students for higher agricultural education through colleges in Agricultural Universities is very restricted. This lacerating fact has compelled the government to think and rethink on the issue of privatization of agricultural education and accordingly decision in this context has been prudently executed to permit desirous, eligible private institutes to start agricultural colleges not in the state of Maharashtra but also throughout the country.

The very objective of this policy decision was to give a fillip to higher education in agriculture and to procreate variegated opportunities of employment and self employment and also to see that the graduates in agriculture from private institutes develop confidence and competence to take their farming in villages on scientific lines and establish a model for others. While granting privatization of agricultural education specific guidelines, norms, rules and regulations were framed meticulously so that only those who possess the necessary infrastructure and facilities can run these private colleges. The latent global objective behind this strategy was to ensure quality education in agriculture. Accordingly, privatization of agricultural education is being observed on large scale. History of various schemes of development clearly indicate that noble objectives with which the schemes of welfare and development were embarked upon, were not satiated and some anomalies, deviations and snags were developed at the stage of execution. These bitter experiences are a warning bell to the planners, administrators, thinkers and educationists to see that the norms and standards are not peddled on any ground.

To keep away this undesirable state of affairs there should be an in-built mechanism for monitoring and evaluation of these private institutes in agricultural education so that they perform their mandatory task on right track and in right perspective. Under no circumstances, there should be a room for relaxation of the norms and rules. Otherwise, the generation to come will not pardon us and responsibility of spoilage of this generation will rest on those who are involved in granting privatization. If this is being followed scrupulously,

the privatization of agricultural education would prove to be a boon. The fate, quality and sustainability of higher agricultural education through private institutes would depend upon the qualified academic staff employed in these colleges and would also rest on the shoulders of the Heads of the institutes i.e the Principals. Hence a stern, rigid vigil must be exercised by those agricultural universities under whose umbrella these institutes are working. The job performance of an incumbent ultimately depends upon the job satisfaction of an employee. Therefore, it is also obligatory on the part of management of these institutes to ensure perfect matching of the qualification and the salary. If the teachers of such institutes do not get expected salary and are merely treated as daily-paid earners and their over-exploitation exists for a considerable period of time, it is sure that ruin of such institutes is imminent. In addition, the management of the private agricultural colleges should also take care of imparting practical training to their students; theory must be related with practical and this vital aspect of education is connived at. There would be least scope for the necessary proficiency and skill development in the taught which is very much essential to build confidence and competence for self-employability. Another crucial issue about privatization of agricultural education which warrants attention is the establishment of well equipped library. Here also it is important for the supremos of the agricultural university to inculcate in the management of agriculture colleges to establish model libraries and if required prodding to some extent may also be exercised.

Another grave concern which has a direct linkage with the future, prosperity, name and fame of these private agricultural colleges is smooth and fair conduct of the examinations. If we lose sight of these vital issues, all the efforts will be foiled. We read in newspapers, hear on radio, listen on television that malpractices to a greater extent have crept in related to the various issues of examination. To cite an illustration, cases of question paper leakages are rampant. Concerned college authorities allow for resorting to mass coping. These bad aspects are very much detrimental and fatal to the fate of the institutes involved in higher learning. It is, therefore, strongly advocated that by all means, private agricultural colleges should refrain from these evilous practices; if the controlling authorities of agricultural universities witness a fraction of such instances, all necessary measures may be taken to nip them in the bud. If it still persists, permission of such colleges may be withdrawn and their names should find place in the black list.

Another related issue on which I want to ponder over is the supervision and conduct of examination of such private colleges and evaluation of answer papers of students. Government has reposed a confidence and has given recognition to such private institutes. Hence for conducting all examinations and for assessment of papers, a collateral system may be developed in which one private agricultural college may take care of other private agricultural college about these dimensions just now referred.

A word of caution would also be not out of place in light of the prospects of privatization of agricultural education. The authorities should ensure that there enters no element of indiscrimination while granting permission to such private institutes of higher learning in agriculture. Furthermore, to have amicable and effective relationship of agricultural universities and these private institutes, a perfect mechanism for the exchange of views, experiences, control and supervision has to be established. To adjudge the efficacy of these institutes and for further amelioration, quinquennial review of such institutes may be undertaken. To conclude indisputably, privatization of agriculture is a welcome move. But for coming up to the expectation of society and nation at large, whatever is meditated in the paper need to be looked into with right spirits.

Knowledge For Development

Ram K. Dwivedi

*CAB International, India Office
CG Block, NASC, Pusa Campus
New Delhi-110012*

CAB International (CABI) is a statutory inter governmental technical agency mandated to address the generation, access and use of knowledge for sustainable agriculture, environment management and human development. Initiated in 1913, in response to the demand for international action to manage problems in tropical agriculture and to gain the benefit of sharing scientific information between countries, CABI has been jointly owned and driven since its inception by a consortium of both developed and developing countries. CABI's 44 Member Countries now include many of the world's major agricultural economies and contain around half of the world's population. CABI's mandate remains to provide skills, underpinning resources and international connections that complement, develop and partner national capabilities.

The use of knowledge to make informed choices lies at the heart of sustainable economic development, whether in the setting of national or international policies or in the options available to a resource-poor farmer. Knowledge empowers individuals, communities and governments to make effective and informed choices to sustain and develop livelihoods. Knowledge provides the poor with the confidence to make constructive changes. The use of scientific knowledge in support of development has always been central to the purpose of CAB International. We generate knowledge through research in our specific areas of expertise in the biological sciences. We enhance access to knowledge, which is provided at a range of levels from the community to the policy maker through innovative systems of information compilation and delivery. We work through participatory processes and new media to bring knowledge alive within communities, bringing scientific knowledge together with indigenous innovation to empower the rural poor and other socially disadvantaged groups and overcome barriers to development. CABI's combination of skills in information management and problem-solving science, together with our international ownership, combine to create a leading role in promoting the generation, access and use of knowledge for and by communities towards global development, and aims at poverty reduction, environmental sustainability and regeneration, gender equality, public health and education for the poorest.

Specific Development Objectives

CABI's role can be summarized under three main hands:

1. Knowledge Management for Human Development

As a world leader in the compilation, distillation and management of scientific information in the applied life sciences, CABI aims at ensuring that these outputs, services and skills are accessible to the developing world, through establishing knowledge-rich environments and capabilities by which development issues can be addressed.

CABI is a key partner in global initiatives facilitating access to scientific knowledge among the poorest communities. Our particular focus is in the management and provision of objective and authoritative content for knowledge transfer systems that use enabling technologies, and in facilitating participatory mechanisms of knowledge, evaluation and validation by communities.

Human development is directly supported through the sharing of scientific and technical knowledge via networks, innovative information tools and development of information management capabilities in partner institutions. The use of the Internet and mechanisms that bring ICTs directly into rural communities such as rural telecentres, together with information management skills, transform knowledge from authenticated science to that which can be validated and trusted by communities themselves. Participatory learning exercises, transformation of language and the use of new media help to overcome socio-cultural and language constraints and to enable indigenous knowledge to be valued alongside that derived from science.

2. Sustainable Development and the Environment

The loss of natural environments and their associated biodiversity is one of the most pressing issues facing developing countries. The degradation of environments leads to loss of biological resources, changes in rainfall and climate patterns, loss of soil fertility and biological water retention. This threatens the very capacity of the land to produce the food and raw materials on which sustainable livelihoods and food security depend. CABI's work addresses 3 key areas:

Microbes are among the greatest natural resources available to many countries and yet are greatly neglected, despite their value in agriculture, pharmaceuticals and industrial applications. CABI plays a critical role in understanding and using microbial diversity to the economic advantage of the poor, through building capacities for countries to identify and characterize microbial strains, development of supporting resources and IPR systems and uptake pathways to ensure that appropriate benefits from microbial exploitation revert to the source country and community concerned.

Invasive alien species pose the greatest biological threat to sustainability of natural systems and impose an enormous economic cost on agriculture, native habitats, fisheries and in turn on human welfare. CABI is addressing alien invasive species and the Global Invasive Species Programme, working to support many countries in their management plans for invasive species. CABI also has a long and successful history of using its international network of Bioscience Centres to facilitate the direct management of invasive alien species, in particular through the development and application of biological control measures. This work has saved countries millions of dollars in pest management costs.

Agricultural systems are under pressure from many directions, from pollutants arising from intensification, climate change, urban settlement, erosion and socio-economic changes. The functional relationships between economic, social and environmental aspects of sustainable systems remain poorly understood, and CABI is working with countries and food industries to generate synergies, rather than trade-offs, between different practices, based on scientific analysis and direct engagement with the communities concerned. This includes enabling communities to judge alternative systems and technologies for themselves, based on access to impartial information and participatory learning processes.

3. Rural Livelihoods and Food Security Improved for the Resource-poor

The world faces major agricultural challenges in continuing to meet food demands against a background of population increase, globalization of markets and loss of natural resources. Moves towards high input/high output systems and large-scale monoculture production have resulted in displacement and poverty among rural smallholders and the loss of bio-diverse environments. The resource-poor and smallholder farmers are thus the specific focus of CABI's activities to support, sustain and develop food production and small rural industries for economic growth. To address these aims, CABI works increasingly with the whole market chain to ensure that outcomes have lasting impact.

CABI has a long, successful history of supporting and encouraging the use of biologically-based agricultural technologies for the sustainable management of pest problems, with many decades of experience in the development and use of biological control technologies and in understanding the complex interrelationships of micro-organisms and plants in agriculture. This approach is more relevant than ever with the desire for 'evergreen' systems that ensure long-term sustainability of agricultural systems, without over-reliance on costly and potentially damaging external inputs.

Export promotion, particularly in value-added markets, has led to the fastest economic growth among the developing countries, and has led to a rapid decline in poverty in east Asia in particular. Under the free trade policies of the WTO countries, science, in the form of non-tariff barriers to trade, is now the prime arbiter of international trade. However, developing countries often struggle to compete because of the disparity in scientific resources between developed and developing economies. CABI maintains some of the key global information and scientific resources on which the world's plant quarantine decisions are based. By mobilizing these alongside the development of capacities and risk management systems within member countries, CABI is significantly 'levelling the playing field' in international trade negotiations.

The development of effective systems by which agricultural knowledge can be made available to rural communities for their own evaluation and use is a key need throughout the world. The global challenge of institutionalized barriers to the uptake of potentially valuable technologies and under-resourced extension systems, requires new processes by which knowledge of options for change and their underlying basis can be made available to rural communities in relevant, accessible and sustainable forms. CABI is working in partnership with programmes such as those organized under the Global Forum for Agricultural Research (GFAR) to create systems that link and integrate knowledge relating to rural livelihoods and is exploring the provision of agricultural knowledge through mechanisms such as rural telecentres that provide direct electronic access to agricultural knowledge at the village-level.

What does CABI bring to Member Countries in addressing the Millennium Development Goals?

- Information & Knowledge management skills and very extensive scientific information databases
- Resource collections representing years of accumulated and authenticated knowledge from around the world
- Sustainable technologies for managing specific problems and development constraints, particularly in agricultural systems
- International operation and connection to other countries, their systems and market requirements and the ability to mobilize their own scientific resources and skills
- Public & private partnerships through our focus on outcomes and our connections to industries working internationally who wish to adopt more sustainable practices
- Experience derived from many decades of work in our key areas of strength
- External learning and the ability to bring together and make rational use of knowledge derived from numerous sources.

Revamping Private Higher Agricultural Education in Uttar Pradesh

B. B. Singh

N.D. University of Agriculture & Technology, Kumarganj, Faizabad (UP)

In the global scenario, India acquires the position of second largest educational system and having the third largest pool of skilled manpower. It has approximately 304 Universities, including 62 deemed to be Universities, 14,600 colleges, 8.9 million students and 0.4 million teachers. In the early fifties, the number of Universities were only 30 and 750 Colleges with 2,63,000 students and 24,000 teachers. It shows an increase of 12 times in the number of Universities and 20 times in the number of Colleges within only fifty years. If the similar situation persists, India would need another 2000 Colleges and 75,000 teachers by the year 2007 at the rate of 2 million additional students every year. At present, higher education is reachable only to 7.2 percent of the youth in the age group of 16-24 years. India has an adult (15 years and above) literacy rate of 57.2 percent.

The Government of India spends only 3.7 per cent of the GNP on higher education, while it is committed to spent 6% of the GNP on education in the 9th Plan. The share of higher education declined because the public expenditure on higher education has increased. This is primarily because of overall resource crunch and lower priority accorded to higher education.

Resource crunch has often been considered as one of the impediments for the development of higher education, which may necessarily be given due consideration. The Kothari Commission in 1964-66 had suggested that atleast 10% of the budget should be earmarked for education while the commitment of 6% is not even touched. Since higher education is facing critical problems of access and quality, participation of private sector in the field of higher education has now become more inevitable.

Indian Higher Education System has grown manifold since 1857. Now it has become one of the main strengths of the country. It is led to development of skilled human resources, which are sought after throughout the world. The main strength of our higher education system is that it is highly subsidised and certain institutions like IITs and IIMs are of international standards. The weakness is that majority institutions are lacking in quality and are becoming complacent.

Private Educational Institutions

In 1949-50, private institutions of learning formed 36.4 per cent of total educational institutions. In 1995-96, they formed only 16.66 per cent. This may be because of the trend of nationalization of most of the activities of the country. In the era of nationalization, the Government and the public started thinking that only the nation has the responsibility to cater to all needs of the people including education. This has severely discouraged the opening of new private colleges in that period.

Now at the advent of globalization and open economic system, the situation of nationalization has become irrelevant. The Government is now unable to finance most of the institutions, which it had established at the time of nationalization and later on. It is because of the multifarious responsibilities and change of priorities of the federal government. The resource crunch has compelled the Government to encourage the privatization by opening private educational institutions.

Higher Agricultural Education

In the beginning of 20th century it was needed to promote the agricultural education in India. In 1905, Imperial Agricultural Research Institute was established, followed by six agricultural colleges in different regions of undivided India. Imperial Council of Agricultural Research (ICAR) was set up in 1929, with a view to strengthen agricultural research and education. In 1960, the Land Grant Pattern of USA was adopted to establish first Agriculture University at Pantnagar. The integrated system of teaching research and extension was the special feature of the agriculture University. This has created revolution in the National Agricultural Research System. Almost all the states had adopted this system to establish at least one State Agriculture University in their territory. At present NARS has 34 SAUs, 5 deemed to be Universities, 3 Central Universities and one Central Agricultural University with 261 agricultural colleges, (including more than 50 private ones imparting higher education in agriculture Table 1). Admission capacity is 13,500 graduates, 5000 post-graduate and 1500 Ph.Ds. Undergraduate courses in 11 subjects and post-graduates courses in 90 subjects in agriculture and allied fields are offered.

The ICAR-SAU system existing in India for agricultural education is the worlds largest network of its kind. It may probably be considered as one of the most successful amongst the other systems existing globally. In India more than 52 Colleges and institutions are providing degrees in higher agricultural education outside the ICAR-SAU system. They are not being supported either by the UGC or ICAR. However, the Institutes of Agricultural Sciences in Central Universities get the support of ICAR, such institutes are BHU, AMU and Vishwa Bharti. The School of Agricultural Sciences and Rural Development of Nagaland University does not get the support from ICAR. The pattern of education is similar in the Central Universities while it is different with those general universities, which are governed by the states and possess the affiliating character.

Prof. Kirti Singh in his paper "Accreditation of Institutions Outside National Agricultural System" mentions that about 35 colleges in Uttar Pradesh, 5 in Rajasthan, 2 in Maharashtra, 2 in Tamil Nadu, 2 in Pondichery and 1 each in West Bengal, Punjab, Andhra Pradesh and Goa are affiliated to general Universities. Two colleges in Pondichery are affiliated to Tamil Nadu Agricultural University and the Central University of Pondichery. Two colleges in Maharashtra are affiliated to Punjab Rao Krishi Vidyapeeth. Two colleges in Madhya Pradesh are constituent of Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya. Allahabad Agricultural Institute has since become deemed to be University. College of Agriculture at Annamalainagar is a constituent of Annamalai Agricultural University of Tamil Nadu.

In most of the Colleges affiliated to the general Universities, the system of education is traditional with 100% external examination and evaluation. Most of the colleges are multi-faculty with agriculture as one of the faculties. Even at the University level some colleges offering the degree in agriculture belong to science faculty, particularly in Rajasthan. Some colleges are following entrance tests for admissions while others admit students on the basis of marks obtained at the qualifying examinations. Number of students for admission is quite variable as there is no proper check to accommodate prescribed number of approved seats.

Proper infrastructure and adequate facilities play a vital role in imparting quality education and overall physical and cultural development of students in general and more particular in agriculture. The other important pre-requisites for quality assurance in agricultural education is the adherence to the norms and standards by educational institutions. The private colleges running the degree programmes in agriculture have extreme variations in the courses and curriculum. They do not have proper classrooms, laboratories, library, equipment, instrumental farms including dairy, poultry units etc. with inadequate students welfare facilities. Most of them are facing serious financial problem, as they are managed only by the private management systems.

Moreover, the state government only provides grants to pay the salary of the teachers. To meet out their financial crisis most of these colleges run the P.G. and Ph.D. programmes in agriculture on the pattern of self financing. Thus on the basis of self financing of the students, it is difficult to equip the laboratories with the most modern equipments and create the facilities for agricultural education upto the level of SAU's.

A large number of substandard agricultural graduates, post-graduates and even doctorates are produced every year by these colleges. Some of them are not even recognized by the State Governments but still they are affiliated with the general universities. Prof. Kirti Singh mentions in his lead paper submitted in National Symposium Accreditation for Quality Assurance in Agricultural Education held on Nov 23-24, 2000 that "There is no system of monitoring and assessment and also no norms and standards have been prescribed. There were several committees appointed by the ICAR earlier to look into the working of such colleges but the recommendations and suggestions made by them from time to time have not yielded any fruitful results so far".

It is important to mention here that agricultural graduates and post graduates passing out from those private colleges outnumber those passing out from SAU's/DUs/ICAR institutes, resulting in a huge force of mediocre and sub-standard graduates and postgraduates due to deficient curriculum. In the general Universities, the influence of Arts and Science has much more than that of Agriculture. They observe the pattern of holidays of the traditional Universities neglecting the time suitability to the agriculture students. Whereas they have to follow up strictly the time/season schedule of agricultural activities viz., pre-sowing preparation of land, sowing, weeding, irrigation, fertilizer use, harvesting and post harvesting etc. While in the traditional system, colleges do not observe the pattern of the SAUs of semester breaks, their students are mostly deprived of the major agricultural practices. In the longer run, they remain ignorant of these important agricultural functions, which they may utilize in their future research and extension activities during their service period.

RAWE Programme

RAWE (Rural Agricultural Work Experience) is a key component recently introduced in Under Graduate Programme of the Agriculture Universities. The groups of the students are given rigorous orientation and exposure to the various issues and problems at the farmers' fields staying there in the villages. The students are placed in different villages. The teachers of different subjects are also being involved to improve their learning capacity in a typical village surrounding.

In the SAU-ICAR system of education, this practice is being adopted according to the recommendations of the Deans Committee Reports. The private colleges which are affiliated to the general Universities adopting the traditional system of education can not effectively implement this programme. This is a major shortcoming of the private colleges. This drawback has to be considered seriously while reorienting the Agricultural Education System of the private colleges.

Dr. R. B. Lal, Vice-Chancellor, AAI Deemed to be University, observes the shortcomings and points out the following important issues in those colleges in his lead paper submitted in the "National Symposium on Accreditation for Quality Assurance in Agricultural Education" held on 23-24 November, 2000: –

- Lack of motivation or drive for higher education (agricultural and technical) in the students
- Job oriented approach to higher education.
- Lack of properly trained teachers

- Lack of opportunity to refresh the knowledge of teachers
- Lack of availability of minimum infrastructural facilities required for agricultural education

Improvement in Private Agricultural Education

Prof. R. B. Lal, Vice Chancellor, AAI Deemed University, mentions in his status paper (23-24, November, 2000) the constraints for quality assurance in agricultural higher education as below:

- Non- availability of national standards through professional bodies
- Difficulty imposed by states and general Universities for autonomous status to agricultural colleges
- Lack of infrastructural facilities and specialized staff in many agricultural colleges
- Inadequate/no funding for upgrading laboratories and library facilities
- No norms for agricultural education in higher education department of the States (i.e. for Arts and Science colleges, teaching posts are given on the basis of the number of students and the colleges are categorized as A, B, C for grants on the basis of number of students). These norms can not work for agricultural and technical education
- Teachers and students have no academic freedom for teaching, evaluation, updating of syllabi and research

The report of the committee on agricultural education headed by Dr. M.S. Swaminathan mentions in its recommendations (Part A) in 1997 about the private Agricultural Colleges that these do not have adequate infrastructural facilities for imparting practical skills and training. There is need for improving their educational standards. In view of various administrative problems, these colleges cannot be made as affiliated colleges of SAUs. Despite this, substantial improvement in education in these colleges is possible by giving the oversight responsibility to SAUs for the limited purpose of conduct of examinations and enforcement of common curriculum. It is also necessary to introduce a uniform system of education with regard to admission through entrance examination, duration of degree programmes and evaluation and grading in line with SAUs. Refresher courses could be organized for updating the skills of the staff from these Colleges in SAU'S and ICAR institutions. The ICAR should provides guidelines for monitoring and accreditation for private Agricultural Colleges, as it is giving for SAUs. To enforce these structural changes, it is important to provide some development grants for improvement of library, laboratory, equipments and farms and for the establishment of an educational technology cell. Such colleges need to be assessed for their potential. Those which do not have minimum infrastructure need to be closed, while others could be supported and brought into the main stream. An expert committee may be constituted by ICAR for this purpose.

For imparting quality education, following suggestions were given by Prof. Kirti Singh in his lead paper submitted in National Symposium on 'Accreditation for Quality Assurance in Agricultural Education' 2000:-

1. There is a strong need for subjecting such institutions to pass through the process of accreditation to bring some of the good ones into the main stream and help them to achieve desired standard's of quality education; others institutions may follow in due course when they reach the desired level.
2. Separate guidelines for accreditation of these colleges should be prepared by the ICAR which should also support them financially and monitor the standards of education.
3. All colleges should be affiliated with Agricultural Universities of their respective regions for following similar system of education and guidance including courses and curriculum.

4. All teachers in these colleges should be appointed in UGC-ICAR scale through proper selection from among NET qualified candidates.
5. Students of these colleges should be admitted through entrance test only and their number should be restricted and commensurate with the facilities available.
6. Knowledge and skill of teachers should be updated through refresher courses and special trainings.
7. The classrooms, laboratories and libraries of the colleges should be modernised with latest equipments, trained staff and proper buildings.
8. Each college offering degree programme should have at least 10 hectares of instructional land in addition to reasonable size of dairy, poultry, sheep, goat and fishery units for proper practical trainings to the students.
9. Each college should have proper facilities of hostels for boys and girls, games and sports including play ground, gymnasium and transport for use by the students.
10. Each college should be given adequate financial support by the concerned state government in terms of regular recurring and non-recurring grants besides salaries of teachers and supporting staff.

Dr. R. B. Lal, Vice Chancellor, AAI Deemed University suggests in his lead paper in the same National Symposium, the following measures to get better output of human resources in agricultural sciences from the private agricultural colleges-

1. All Agricultural Colleges should be affiliated with the Agricultural Universities of the respective regions (SAUs/DUs/ICAR) for the purpose of admission, framing course curriculum, examination, evaluation and grading etc.
2. The state should not allow any Agricultural College to open new agricultural programmes without prior approval from the ICAR, which it shall give after verifying the facts of college before approval. It also envisages inspections/visitations of Agricultural Colleges for permission to start Agricultural Colleges for UG and PG courses and to increase seats.
3. ICAR should support Agricultural Colleges financially by developing separate guide lines for monitoring the standard of education through accreditation and strengthening laboratories, library, teaching programmes etc.
4. Regular monitoring of Agricultural Colleges standards and helping them to overcome the difficulties in phased manner in
 - a) Infrastructure development
 - b) Laboratory/library/technology
5. To attend qualified and competent teachers, they should be appointed in UGC-ICAR scales through the process of selection as prescribed by respective University rules.
6. To have uniformity in Agricultural Education, semester system of teaching should be made mandatory, sufficient grant from ICAR should be provided and respective SAUs/DUs/ICAR will guide the college to run in this manners.

7. In the colleges which are multifaculty, there should be separate College of Agriculture in terms of the infrastructure including administrative block, classroom, laboratories, equipments, staff, hostels, library, instructional farms etc. The faculty of agriculture should have separate board of studies.
8. The management committee of the college should include an eminent Agricultural Educationist/Scientist, a nominee of ICAR, A Veterinary Scientist etc.
9. For maintaining desired standard of Agriculture Colleges SAUs/DUs/ICAR should help them in technical know-how.

The State governments are suffering through serious economic crisis. They find themselves unable to fulfill the genuine and bare minimum needs of the State Agricultural Universities. Hence these Universities are facing severe financial crunch to run effectively and meet the thrust of recent trend of globalization. Under such circumstances, existence and nourishment of private agricultural colleges becomes inevitable. Moreover, these colleges produce agricultural scientists with low potentialities due to lack of infrastructural support, qualified and experienced teaching and supporting staff, shortcomings in the course curriculum, less exposure to practical trainings etc. Since there is no other alternative except to accept those colleges and make them more effective by bringing them in the main stream under the umbrella of SAU-ICAR system, funding them properly and providing training to their teachers becomes inevitable so as to strengthen them to produce superior quality and highly skilled human resources in agriculture. On the other hand, this will minimize the burden and tension of SAUs / DUs / ICAR of producing superior quality of agricultural scientists by sharing their responsibilities.

Table 1:- Institutions offering programmes in Agricultural Sciences outside ICAR-SAU System

State and Universities	Colleges / Institutions
I. Private Institutions not getting ICAR Financial Support	
Uttar Pradesh	
Ch.Charan Singh University Meerut	<ul style="list-style-type: none"> • Amar Singh College, Lakhaoti, Bulandshahar • Ch.Chhotu Ram Post Graduate College, Muzaffarnagar 251001 • Gochar Mahavidyalaya, Rampur Maniharan - 247 451, Saharanpur • Janta Vedic College Baraut 250 611, Baghpath. • Rashtriya Kisan Degree College, Shamli, District Muzaffarnagar. • Kisan Vidyalaya Post Graduate College, Machhra, Meerut • Post Graduate College, Simbhaoli 245 207, District Ghaziabad • RMP Post Graduate College, Gurukul, Narsan- 249 406, District Haridwar (Now in Uttaranchal State) • Institute of Advanced Studies, Meerut University Campus, Meerut - 250 005
Veer Bahadur Singh Purvanchal University, Jaunpur 222 002	<ul style="list-style-type: none"> ▪ Government Degree College, Jakhini 221 305 Varanasi ▪ Murli Manohar Town Post Graduate College, Ballia – 277 001 ▪ Post Graduate College, Ravindrapuri, Ghazipur - 233 002 ▪ Shree Ganesh Rai Post Graduate College, Dobhi, District Jaunpur ▪ Tilak Dhari Post Graduate College, Jaunpur 222 002

- Udai Pratap Autonomous College, Varanasi - 221 002
 - Shri Durga Ji Post Graduate College, Chandesar 276 128, Azamgarh
 - Mohd. Hasan P.G.College, Jaunpur
 - Baba Raghava Das Post Graduate College, Deoria 274 001
 - National Post Graduate College, Barhalganj - 273 402 Gorakhpur
- Deen Dayal Upadhyay Gorkhpur University, Gorkhpur 273 009
- Chhatrapati Sahuji Maharaj University, Kanpur 208 024
- Janta Degree College, Ajitmal - 206 121 Auraiya
 - Janta College, Bakewar, District Etawah
 - Kulbhaskar Ashram Post Graduate College Allahabad 211 007
 - C.B.Gupta College of Agriculture, Bakshi-Ka-Talab, Lucknow
- Ram Manohar Lohai Awadh University, Faizabad 224 001
- ❖ Madan Mohan Malviya Post Graduate College, Kalakankar 229 408, Pratapgarh
 - ❖ Deegree College Nandininagar, Gonda
- Dr.Bhim Rao Ambedkar University, Agra 282 004
- Raja Balwant Singh College, Bichpuri, Agra
 - Narain Post Graduate College, Shikohabad - 205 135
 - Ch.Charan Singh Shivadan Singh ;Mahavidyalaya, Iglas 202 124, Aligarh
 - Sarvoddhaya Mahavidyalaya College, Chumuhan 281 406, Mathura (UP)
 - Lal Pokhpal Singh cottage Achalpur 207 125 (Etah)
- Allahabad Agricultural Institute, Allahabad 211 002
- Allahabad Agricultural Institute, Naini 211 002 Allahabad
- Bundelkhand University, Jhansi 284 001
- Baba Brahamanand Degree College, Rath, District Hamirpur
 - Zila Parishad Agriculture College, Banda
- Mahatma Jhotibla Phule Rohilkhand Univeristy, Bareilli 243 001
- R.S.M. Post Graduate College, Dhampur 246 761, District Bijnor
- Rajasthan**
- Maharishi Dayanand Sarwati University, Ajmer 305 001
- Dayanand College, Ajmer
 - Swami Keshavanand Mashavanand Mahavidyalaya, Gramothan Vidyapeeth, Sangaria, Rajasthan
 - Government Degree College, Sawai Madhopur
 - Parmanand Agricultural College, Gajsinghpur, Sri Ganganagar
- University of Rajasthan, Jaipur 302 004
- ❖ Baba Bhagwan Das Government Post Graduate College, Chimanpura, Shahpura, Jaipur
- West Bengal**
- University of Calcutta, Calcutta 700 073
- College of Agriculture, Calcutta 700 019

Maharashtra

Punjabrao Deshmukhi Krishi
Vidyapeeth, Akola 444 104

- Shivaji College of Agriculture, Shivaji Nagar,
Amaravati - 444 603
- Anand Niketan College of Agriculture, Warora 442 914,
Chandarpur

Punjab

Guru Nanak Dev University,
Amritsar 143 005

- Khalsa College, Amritsar 143 002

Tamil Nadu

Annamalai University,
Annamalainagar 608 002

- o Faculty of Agriculture, Annamalainagar 608 002

Tamil Nadu Agricultural University,
Coimbatore

- o Adhiparasakthi Agriculture College, Kalavai - 632 506 District
Velur

Pondicherry

Pondicherry University,
Pondicherry 605 014

- Rajiv Gandhi College of Veterinary and Animal Science,
Kurumbapet, Pondicherry - 605 009

Tamil Nadu Agricultural University,
Coimbatore 641 003

- Pt. Jawaharlal Nehru College of Agriculture & Research
Institute, Karikel 609 603

Nagaland

Nagaland University, Luxmani,
Kohima 797 001

- School of Agricultural Sciences and Rural Development,
Medziphema 797 106

Madhya Pradesh

Mahatma Gandhi Chitrakoot
Gramodaya Vishwavidyalaya
Chitrakoot 485 331

- ❖ College of Agriculture, Chitrakoot 485 331
- ❖ College of Agricultural Engineering, Chitrakoot 485 331

Andhra Pradesh

Osmania University
Hyderabad 500 007

- Loyala Academy (Autonomous) Degree College Old Alwal,
Secunderbad - 500 010

Goa

Goa University, Talegau Plateau
Via Panaji, Gao 403 206

- Bharatiya Veterinary College (A Unit of SS Foundation),
Shanker Building, 925 Borkar Road, Akto Torda, Alto
Porvorim, Panji, Goa - 403 521

II. Institutions getting ICAR Financial Support

Uttar Pradesh

Banaras Hindu University, Varanasi
Aligarh Muslim University, Aligarh

- Institute of Agricultural Sciences, Varanasi
- Rafi Ahmed Kidwai Institute of Agricultural Sciences, Aligarh

West Bengal

Vishva Bharti, Sriniketan

- o The Institute of Agriculture (Palli Siksha Sadan) Sriniketan

III. Institution not needing ICAR Financial Support

West Bengal

IIT, Kharagpur

- Department of Agricultural Engineering, IIT, Kharagpur

Table 2. Faculty-wise students enrolment for the year 2001-02 in India

Faculty	Total Enrolment	Percentage
Arts	4069632	46.13
Science	1754110	19.88
Commerce/Management	1575940	17.87
Education	114678	1.30
Engineering/Technology	605597	6.87
Medicine	275943	3.13
Agriculture	52833	0.60
Veterinary Science	14270	0.16
Law	280449	3.18
Others	77643	0.88
Total	8821095	100.00

Source: U.G.C. Annual Report 2001-02

Table 3. An overview of agricultural educational system in India

Type of University	Number of Universities	Number of Colleges
State Agricultural Universities	34	200*
Central Agricultural Universities	01	06
Deemed to be Universities	05	10
Central Universities having Agricultural Faculty	03	03
Indian Institute of Technology, Kharagpur		01

*Includes 09 privately run affiliated colleges.

Source: "Higher Agricultural Education in India"-Status and Changes"- Dr.J.C.Katyal, D.D.G. (Edu.) ICAR, New Delhi.

Paper presented in 27th Convocation of IAUA at ANGRAU, 9-11 December, 2002.**Table 4. Number of colleges in agriculture & allied sciences in SAU – ICAR system in India**

Faculty/Colleges	SAUs	CAUs	DUs	CUs	Affiliated to SAUs	Affiliated to General Universities	Total
Agriculture	67	01	02	03	10	38	121
Veterinary & Animal Sciences	34	01	02	-	-	01	038
Agriculture Engineering	20	-	01	-	-	01	022
Home Science	16	-	01	-	-	-	017
Fisheries	11	01	01	-	-	-	013
Forestry	09	-	01	-	-	-	010
Horticulture	13	01	-	-	-	-	014
Dairy/Food Sciences	09	-	02	-	-	-	007
Basic Sciences & Agri-Coop							
Banking & Management	03	-	01	-	-	-	003
Sericulture	01	-	-	-	-	-	001
Total	189	04	11	03	10	40	257

Source: Reorienting Agricultural Education: "A Weepiest for Global Competitiveness"- Dr. S. L. Mehta and Dr. J. S. Bhatia
Paper presented in 27th Convention of IAUA at ANGRAU, 9-11 December, 2002

DICUSSIONS

Dr. J. C. Katyal, DDG (EDU) initiated the discussion. He gave the scenario of private agriculture colleges in India. He said that the report of the committee on agricultural education headed by Dr. M. S. Swaminathan mentioned in its recommendations in 1997 about the private colleges that these do not have adequate infra-structural facilities for imparting practical skills and training. There is need for improving their educational standards. In view of various administrative problems, these colleges cannot be made as affiliated colleges of SAUs. Despite this, substantial improvement in these colleges is possible by enforcement of common curriculum. It is also necessary to introduce uniform system of education with regard to admission through entrance examination, duration of degree programmes and evaluation and grading in line with SAUs. Refresher Courses could be organized for updating the skills of the staff from these colleges in SAU and ICAR institutions. To enforce these structural changes, it is important to provide some developmental grants for improvement of library, laboratory, equipments and farms and for the establishment of an educational cell. Such colleges need to be assessed for the potential, and those which do not have minimum infrastructure need to be closed, while others could be supported and brought into the main stream. He also mentioned about the observations of Prof. Kirti Singh on accreditation of institutions falling outside SAU system. In these observations, it has been found that there are about 50 private colleges imparting instructions in agriculture and they fall broadly in three groups as under:

- a) Institutions imparting education on the pattern prescribed by ICAR;
- b) Institutions which follow partly the recommendations of ICAR; and
- c) Institutions which do not follow ICAR instructions.

The institutions falling in group (a) have been recommended for funding by the Council (ICAR). However, the matter is still pending before the Council. It was further observed that ICAR has not legal authority to stop proliferation/ mushrooming of private agricultural colleges. The role of open universities in providing agricultural education through distance mode was also discussed and it was felt that in view of the requirements of field experiments in the various disciplines of agricultural science at both UG and PG level, it is not possible / feasible to impart these instructions through this mode. However, the need for building competence of teachers of SAUs through distance mode was felt. He informed that distance mode of education is not existing in agricultural education in any part of the globe except London school where even instructions through distance mode are being imparted in Agricultural Economics, Agri-business Management and Anthropology which require very little practical training.

After initiation of discussion by Dr. Katyal, the Chairman of the session invited discussion on privatisation of agricultural education. Participating in the discussion, Dr. S. S. Magar, Vice-Chancellor, DBS, KKV, Dapoli suggested for formulation of *modus operandi* if privatisation of agricultural education is allowed in the country so that the quality of the education is maintained. He suggested that each SAU should prepare a perspective plan at least for the next 10 years indicating infrastructure including manpower requirement. Citing the example of Maharastra State, Dr. Magar remarked that KKV Dapoli has two affiliated private colleges with intake capacity of 96 for which Maharastra State Council of Agricultural Education conducts the exams. The invigilation during exams is conducted by faculty of the private colleges. SAUs should have 100% control over examination to avoid malpractices.

Dr. B. S. Chundawat, Vice-Chancellor, SKDAU, Gujarat emphasised that private colleges which meet the norms of accreditation for Quality Assurance in Agricultural Education and have affiliation with SAUs should be encouraged and funded by ICAR. He further stressed that there is need to have Agricultural

Council of India. However, in contrast Jenab H. U. Khan, Vice-Chancellor, SKUAST-J quoted negative impact of mushrooming of B. Ed. Colleges in J&K State and in other States where no standards are being maintained for granting admissions and evaluation.

Dr. D. P. Singh, Vice-Chancellor, JNKVV, Jabalpur said that students who fail to secure admissions through Common Entrance Test manage their admission in private colleges of other states without entrance test on donations where no facility of practical exists at all. ICAR needs to be given powers as has being given to VCI.

After the discussion on the theme, it was suggested to constitute a sub-committee to look into the formulation of mechanism for control of poor standards/ proliferation of private colleges. The sub-committee comprising of following members was unanimously constituted to prepare a Draft Policy for improvement in mode of admissions, examinations, evaluation, invigilation of examinations, course curricula and affiliation of private colleges:

- | | |
|--|---------------------|
| - Prof. Anwar Alam, Vice-Chancellor, SKUAST-K, Srinagar | ...Chairman |
| - Prof. C. Ramaswamy, Vice-Chancellor, TNAU, Coimbatore | ...Member |
| - Prof. Parmatama Singh, Vice-Chancellor, RAU, Bikaner | ...Member |
| - Prof. P. L. Gautam, Vice-Chancellor, JBPU of Agri.&Tech., Uttranchal | ...Member |
| - Prof. S. N. Puri, Vice-Chancellor, MPKV, Rahuri | ...Member |
| - Prof. S. S. Magar, Vice-Chancellor, DBS, KKVP, Dapoli, Maharastra | ...Member |
| - Dr. R. P. Singh, Executive Secretary, IAUA | ...Member Secretary |
| - Dr. K. C. Katyal, DDG (Edu), ICAR, New Delhi | ...Consultant |

The following recommendations emerged after the deliberations:-

- Private agricultural colleges need to be improved and brought under the umbrella of Accreditation Board of ICAR for providing financial assistance.
- *Modus operandi* for private agricultural colleges in the country need to be worked out to integrated them with SAUs to ensure high quality of agricultural education.
- Private colleges should meet the norms and accreditation standards for quality assurance in agriculture education.
- Privatization of higher education in agriculture should be with the spirit of social service and not for money-making (commercialization).
- The establishment of news SAUs / private colleges should be allowed after prior approval of ICAR subject to the condition that sound financial resources are available and there is a sustained need for such an institution.
- Distance Education cannot give and assure requisite skills and practical training in agriculture which is the growing need. It may serve the purpose in subjects not involving practical like Agri-business Management, Economics, Sociology etc.

- A sub-committee was constituted to prepare the Draft Policy for control of admissions, improvement in examinations / evaluation system and invigilation of examinations, course curricula and mechanism for affiliation of private colleges with SAUs. The sub-committee comprises of Prof. Anwar Alam (Vice-Chancellor, SKUAST-K, Srinagar) as Chairman and five Vice-Chancellors of SAUs (Prof. S.N. Puri, MPKVP Rahuri; Prof. C. Ramaswamy, TNAU Coimbatore; Prof. Parmatma Singh RAU Bikaner; Prof. P.L. Gautam, GBPUAT, Pant Nagar; Dr. S.S. Magar, DBS KKVP Dapoli) as Members. Dr. R.P. Singh, Executive Secretary IAUA shall function as Member Secretary and DDG (Education), ICAR, as Consultant.

TECHNICAL SESSION -III

Governance of Agricultural Universities

S. S. Magar,

DBS Konkan Krishi Vidyapeeth, Dapoli, Maharashtra

The Agricultural Education plays a vital role towards food and nutritional security. The strength of SAUs in the country is consistently increasing due to social demand and requirement of agricultural graduates in rural areas since the establishment of first agricultural university in the year 1961. The emphasis on food and nutritional security is totally dependent on human resource power in agriculture and modern agriculture production technology. The trend of switching over of agricultural education to private sector is also creating opportunities and threats due to inadequate university governance in the system. At the same time, State Governments and the Indian Council of Agricultural Research are not in position to start new agricultural education institutes or colleges. There is a debate on agricultural education related to its autonomy and governance because it comes under higher education pattern. The agriculture is the state subject, and higher education agriculture is at present being accommodated in agriculture sector.

However, higher education is the purview of UGC, financed and governed by the Central Government. No specific conclusions have been drawn on these aspects either by the ICAR or IAUA. It is a fact that the modern agriculture and biotechnology revolutions have paid good dividends, which are more expensive and intensive. These advancements are mostly laid down by the private sectors, whereas share of SAUs is comparatively less. On the other side global scenario is changing fast due to World Trade Organization (WTO) and GATT. Ultimately, SAUs have to keep pace with these challenges. With this background, agricultural education and research have to become globally competitive and University Governance must be effective and transparent to meet the international challenges. It is expected that science and technology play important role, but at the same time SAUs cannot ignore social and political willpower as well as farmers' participation in the system. The SAUs in the country are meant for welfare and financial stability of farmers and agricultural industry in their jurisdiction. Present agricultural Universities Act and Statutes governing SAUs in the country need to cover the perspective improvement for quality education and research. Initially, the ICAR has circulated the Model Act in the year 1994 as the University Governance was considered as the State subject. Some of the SAUs had taken advantage of HRD Phase- I programme accepting partly or fully the said Model Act. Since the success of HRD Phase-I and continuation of HRD Phase-II programme, many SAUs in the country responded in making suitable amendments in the present Act and Statutes. The Maharashtra State was one of them. After the subsequent debates in Vice-Chancellors' Conference convened by the IAUA, it was felt that the Model Act of 1994 has some drawbacks and needs further discussions and modifications. Circulation of Model Act and subsequent management has become very effective for the purpose of coordination in teaching, research and extension education programme of SAUs in the country. It was emphasized by many Vice-Chancellors that newly modified Model Act be circulated by the ICAR at the earliest. In view of these facts, the IAUA has appointed a committee under the Chairmanship of Dr. I. V. Subba Rao, the then Vice-Chancellor, ANGRAU, Hyderabad. After the exhaustive discussions, the report was prepared for consideration of IAUA and ICAR, New Delhi. This IAUA conference has, therefore crucial significance to make concrete suggestions to the State Governments through the appropriate authorities of ICAR, New Delhi.

The University Governance is mostly concentrated with authorities existing in SAUs of the country. Most of the SAUs are controlled by the authorities of the University, specified as 'Board of Management', 'Executive Council', or 'Governing Council', and 'Academic Council', 'Research Council', 'Extension

Education Council' and 'Board of Studies'. Amongst these, the university policy and financial control rest with the Board of Management. Naturally, the composition of this highest authority is the interest of University administration, faculty and students. The Model Act very well defines the composition of the Board of Management.

However, the major threat for education and research programmes is being imposed by increasing the strength of Board of Management. It becomes rather difficult to come to conclusion due to large number of members and their different opinions and backgrounds. It is time now to make the requirements and allied disciplines mandatory for a person to be a member of educational qualification and professional experience in the field of agriculture. The appointment of such members, presently done at the different levels, need to be centralized at the level of the Chancellor only, so that there is no undue pressure over the appointments of these members. It was agreed upon earlier that the strength of the Board of Management should be about 9 to 11 for its effective functioning.

The second authority of SAUs is the Academic and Research Councils. By the Act, these Councils are mostly composed of the academicians of the same University. There is necessity to include the educationalist from other traditional universities in the related subjects and agro-industry based graduates from SAUs. At the same time, the research and extension education councils should be strengthened by inducting 'Krishi Bhushans and 'Krishi Pandits as regular members. The composition of Faculties and Boards of Studies should also have sufficient scope to interact with junior faculty and Student Councils. The University Governance through Executive Officers alone. Some Universities have included in the Act provisions of both the Campus Director and the Pro-Chancellor from the political fields. In the present democratic system, academicians have to accept the participation and inclusion of social and political willpower, but there should be restriction for their direct involvement in university governance. Dr. Subba Rao Committee (2002) clearly indicated that the provision of Pro-Chancellor's position, as existing in some Universities now, should be done away with. Further the composition of Search Committees, as indicated in the report, is quite acceptable. The committee has suggested that the candidate for the Vice-Chancellor's position should be an academician with vast experience and his tenure should be of 5 years and that the Directors, Deans, Head of the Departments, etc. are, in real sense, the strength of any Vice-Chancellor. Their nominations should therefore be done on the National level through appropriate selection committees. Maharashtra is the leading State in establishing 'Maharashtra Council of Agricultural Education & Research' at Pune and constituting excellent Selection Committees for the above posts. Three National level experts and two experts as Chancellor's nominees are real strength of the Selection Committee. Even-though, the Registrar, Comptroller and University Engineer are on deputation for specific period from the State Government, these officers need to be appointed after taking Vice-Chancellor into confidence. The recruitment procedure of academic and other staff positions has been well specified in the Statutes and Act, but basic philosophy accepted by the Agricultural Scientists Recruitment Board (A SRB), New Delhi need to be given some weight age. In view of the efficient governance in SAUs, some of the important points have been deliberated upon below:

- i) **Linkages:** The formal linkage mechanisms for SAUs need to be developed. There should be at least one review meeting of Deans and Directors by ICAR of Research every year. The brain storming sessions and monitoring the progress should be the objectives.
- ii) **Funds and Accounts:** The level of funding of SAUs is far below their requirements. Some of the Universities are not in a position even to pay the salaries of staff regularly. It is less than 0.5% of GDP from agriculture. To exploit the expanding opportunities and meet the emerging challenges effectively, the fund allocation to SAUs needs to be stepped up to a level of 2.0% of GDP from agriculture or to

0.5% of total GDP from the present level of less than 0.5. The ICAR share of funding be raised to the extent of 1/3rd of total funding for the year. The balance funds are to be met by State Governments, SAUs attempting to generate around 10% of their requirement. It is necessary that adequate provisions are ensured for maintenance and development works. The State Government must think of suitable schemes for ensuring regular pension payments. It is always expected that SAUs, which were created on land Grant basis should be self-sufficient. Hence, the generation of funds through technology transfers need to be attempted. The Israel Model of paying 30% as royalty to the scientist and 30% to the University can be considered. The alumni can be approached for substantial contribution. Foreign students may be attracted and a Corpus Fund of 25% be created. The ICAR and State Government have to support through matching grant. The students' fee structure is to be laid down such that it commensurates with cost index.

- iii) **Delegation of powers:** Academic faculties working in research and education should send schemes for funding by external agencies. This will be possible when decentralization of powers and statutory reforms are made from time to time. The Directors may be given sufficient powers when funds are available, to send faculty for national level trainings and participation in seminars, symposia and summer / winter schools. Faculty has to be encouraged for training abroad if no financial commitment is involved. Heads of the Departments may be given powers to sanction under contingencies and repairs to the extent of Rs. 10,000/-. The Principal Investigators may be given full powers. The decentralization of powers is suggested to reduce the burden on the part of Vice-Chancellor and to enable him to concentrate more on innovative work and efficient monitoring. Each University should develop manuals for purchases, etc. with the approval of Management. However, delegation of powers goes with responsibility. The execution of powers also should be monitored in monthly meetings.
- iv) **Accountability:** It is necessary that job charts and performance indicators need to be developed for each cadre for fixing accountability and assessing performance at each level. However, the term accountability does not restrict to University level. Each faculty has to bear in mind the social accountability. Their must be self-assessment in mind to justify one's existence. It means that each faculty or group of faculties should show the social impact
- v) **Modernization of Management System:** The management in SAUs is a dynamic system. The establishment of new faculties and colleges will increase the strength of the academic and supporting staff. But modernization of syllabus by way of either expansion or clubbing will also change existing academic strength. Hence, the self-assessment committees need to be introduced to observe the modern management. The research component of SAUs has to be assessed, monitored and need-based alterations suggested. At present, monitoring for AICRP is done by the respective Assistant Director Generals. The non-productive staff in education and research sectors should be trimmed or redeployed. Every University should aim for paperless and more efficient administration in the modern management system. The ICAR have already provided sufficient funds for modernization of offices and library. However, financial support for maintenance of this infrastructure needs to be provided regularly under development grants. It is also necessary that terminals need to be provided from servers instead of purchasing servers for each unit, wherever feasible. The Directors and the Registrar of SAUs should concentrate on data management periodically. The financial support for networking amongst the SAUs through LAN, WAN and facilities for audio and video conferencing, etc. should be provided by the ICAR after the recommendation of Accreditation Board.

For effective University Governance, some restrictions are imposed by the Act and Statutes from the State Government. Few satisfied areas, which impose the threats and opportunities for SAUs are listed out below:

- i. Affiliation of colleges and institutes outside SAU system, with its inherent problems
- ii. For establishment of new University, approval if ICAR to be made should be mandatory, agricultural education being categorized under 'Higher Education'. A committee should be constituted by the ICAR for starting new affiliated colleges for making recommendations to ICAR.
- iii. Appropriate provisions to be made in the respective Act / Statutes for employees promotion / CAS etc.
- iv. Government to levy certain cess on agricultural produce and products for funding SAU's R&D activities
- v. A separate body like UGC for agriculture with professional approach, financial adequacy and statutory authority on land grant pattern to be considered
- vi. External examination with outside examiner to be reintroduced
- vii. Non-formal education, distance education, vocational programmes, IT cell or cyber cell to be provided/strengthened

Social impact of Agricultural Universities in the States will totally depend upon the University Governance. University Governance is indiscriminatory, where it is difficult to decide the boundaries of various aspects. It is also related to other aspects of accountability, education reforms, research modernization, etc. However, the SAUs in the country are in the satisfactory position, due to consistent efforts made by the ICAR through respective Divisions led by respective Deputy Director Generals under the leadership of Director General, ICAR, New Delhi.

MODEL ACT FOR STATE AGRICULTURAL UNIVERSITIES – IMPLEMENTATION STATUS

J. C. Katyal

Indian Council of Agricultural Research, Krishi Anusandhan Bhawan, New Delhi

With a view to provide legal base for establishment and functioning of State Agricultural Universities, the Government of India appointed an Agricultural University Committee headed by Dr. Ralph W. Cummings in 1960. This Committee submitted its report in 1962 in the form of a Model Act. The ICAR further developed this recommendation and brought out its first Model Act for State Agricultural Universities in 1966. The intent was to help bring about uniformity in the Acts of SAUs and its governance structure and organization. The Model Act was revised in 1984 and again in 1994.

The ICAR has been emphasizing that SAUs Statutes / Acts should be patterned on the lines of Model Act, 1994. Despite this clear understanding, Statutes / Acts of many SAUs are at striking variance with the Model Act. Several crucial provisions-appointment of Vice Chancellors and constitution of Board of management-of Model Act are generally ignored. Broad deviations of Acts and Statutes of various SAUs from those provided in the Model Act 1994 are narrated in Table 1.

As a consequence of deviations effected by different State Governments, autonomous functioning of SAUs is impinged because Statutes / Acts charted by them become the guiding principles of governance and to conduct the affairs of the university. However, in case of CCSHAU Hisar and PAU Ludhiana, it is the Board of Management which enacts the Statutes. Apparently the functioning of these Universities should be more autonomous. In reality it is not so, because senior bureaucrats of the States dominate BOMs and generally their recommendations tend to prevail in decision-making.

Since ICAR does not have any statutory authority to regulate SAU governance, it does not have much say to enforce provisions of Model Act. Apparently, there is need to consider legal empowerment of ICAR not only to ensure implementation of Model Act in letter and spirit but also of Model Code of Statutes for University functioning to regulate agricultural education.

Table. Model Act for SAUs and SAU acts

Chapter / Sections of MA	Provision of MA	SAU Act (Specific variations from MA)	Remark
1	2	3	4
Chapter II			
Section 3(2)	The University shall consist of Chancellor, a Vice-Chancellor, Board of Management, Academic Council and other authorities provided in the Act or the Statutes	<p>Pro-Chancellor (who invariably is Minister of Agriculture), is provided in SAUs of Maharashtra, Karnataka, Kerala & Tamil Nadu</p> <p>Pro-Vice-Chancellor provided in the ACT of RAU-B and KAU. No appointment has ever been made in RAU-B, but there was a Pro-Vice-Chancellor in KAU till 2001.</p> <p>Campus Director: GAU Act provides for Director of campuses (one each for 4 major campuses) appointed by State Govt. He should not be an employee of the University or of the State Govt. Invariably a political person is appointed as campus Director.</p>	<p>1. Now KAU Act has been amended and Pro-VC post removed.</p> <p>2. Campus Director is a major deviation and is against spirit of autonomy.</p>
Section 4(3) Committee	All units (Teaching Research and Extension) are constituent units of the university. There is no provision for affiliation.	<p>Acts of Maharashtra, Tamil Nadu and MPUAT (Udaipur) provides provision for affiliation.</p> <p>TNAU has given affiliation to 3 Agri Colleges, Maharashtra (PDKV) to 2 Agri Colleges. Recently in RAU (B) 5 Agri Colleges & one Veterinary College have been granted affiliation.</p> <p>N.B. Rajasthan has made its intentions clear by incorporating the clause of Affiliation in the newly created Act of MPUAT, Udaipur</p>	<p>Kirti Singh Committee and Sub</p> <p>under Dr. G.B. Singh suggested that Colleges outside SAU system should be given affiliation by the adjoining SAUs rather than with general university if they have to receive funds from ICAR.</p> <p>Recommendations of these Committee have not been accepted by ICAR for implementation</p>
Chapter III			
Section 9	Authorities of the University - BOM, Academic Council Research & Extension Councils, Faculties etc.	In the Universities of Maharashtra there is a provision for Executive Council , which in Kerala and J&K Acts provide for the	General Council is the supreme authority of the University to review the action of executive & academic councils. Thus, in

General Council and Executive Council.

true sense EC (BOM) is under the

Council.

Section 10.

Board of Management - No provision for elected representatives. VC is Chairman & Registrar acts as Secretary. Apart from it, Ex-Officio members mainly suggested by Government, Chancellor and University are nominated.

The newly formulated Act of MPUAT Udaipur provides for only 2 nominees of VC (one each from Dean & Director)

Chapter IV**Section 24**

Vice-Chancellor-Manner of Selection
Chancellor appoints VC from amongst the Panel of educationists / scientists in Agricultural Sciences drawn by Search Committee consisting of DG, ICAR, Chairman UGC or his nominee and one nominee of the Chancellor;

In most of the SAUs, Chancellor has to seek advice of the State Govt. to appoint VC. In CCSHAU & PAU, BOM is dominated by Secretaries of the State Govt. including Chief Secretary thus the decision of the BOM invariably amounts to the decision of the state Govt.

In most of the Universities selection of VC is through Search Committee. However, the composition of the committee is variable from State to State. The manner of appointment in CCSHAU, PAU, ANGRAU is that BOM suggests the name and Chancellor appoints. There is no search committee constituted for this purpose. In GAU, State Government appoints VC of its own

Tenure of VC: 5 years.

Variable between 3 to 5 years. In most SAUs, it is 3 years. With a provision for second term. UP provides for third tenure as well. Tenure is of 4 years in CCSHAU, PAU and 5 years in SKUAST-K J&K Srinagar, JNKVV, KAU, IGKV.

Age: 65 years

No age bar in PAU & CCSHAU

Section 26-28**Other Officers of the University:**

Model Act provides for DRI, DR & DE, Deans of the faculty, Registrar, Comptroller, University Librarian & Student Welfare Officer

From university to university, there are hierarchical variations in structure, nomenclature, powers & duties of Deans, Directors and other officers. The following designations exist in University System: DRI, Dean, Associate Dean

and Principal, Dean PGs in Universities of Rajasthan, all head of the institutions are designated as Dean (irrespective of number of colleges) while at RAU (P) there are 2 Dean positions, one jointly for Agriculture, Home Science & Agri. Engg. faculties, and another for Veterinary, Dairy and Fishery faculties. In most of SAUs there is only one dean for each faculty & Head of the colleges are designated as Associate Dean/Principal. UAS (B) and UAS (D) have Dean for whole university and college heads are designated as DIs.

Registrar, Comptroller, Estate Officers are being sent on deputation from State Governments in most of SAUs

In the act of CCSHAU & PAU Board has the authority to make new or additional statutes & may amend or repeal. In the Act of RAU (B) Chancellor nor it is notified in the official gazette. This has made universities to the Chancellor shall have to consult the Government before granting his assent (this makes it difficult for the amendment to be effected due to procedural delays).

These Councils are primarily State controlled bodies and are thus able to *de facto* impose State's will. These bodies have very little functional relationship

ICAR.

At present, there are two Councils existing- one in Maharashtra (MCAER) and other in Uttar Pradesh (UPCAR). In several other states having more than one Agricultural

University are missing State Councils. Though there is no separate Council for Rajasthan Agriculture Universities but there exists a coordination Committee of Vice-Chancellors of Rajasthan Universities under the Chairmanship of Chancellor. This Committee is partly coordinating the role as is envisaged for the Agricultural Council.

Statutes & Regulations

Statutes how made

Draft proposal is made by the Board & submitted to the Chancellor for his assent. Amended or repealed by Board with the assent of Chancellor. All statutes made shall have to be published in official gazette.

Miscellaneous

State Council of Agricultural Education and Research

There shall be State Council for Agricultural Education & Research in the States having

more than one Agricultural University for effective co-ordination & periodic evaluation of the universities. The composition of the committee includes Chancellor as Chairman, a Vice Chairman as whole time Council Executive, VCs of Agriculture Universities, Chief Secretary, Secretaries of Agriculture, AH, Finance, Planning & ICAR representative as members

Chapter VII

Section 40

Chapter VIII

Section 50

with

DISCUSSIONS

Dr. S.S. Magar, Vice – Chancellor, DBS Konkan Krishi Vidyapeeth, Dapoli, Maharashtra gave a lucid account of governance of agricultural universities and highlighted that higher agricultural education should be the purview of ICAR on the pattern of higher education being under the purview of UGC, financed and governed by Central Government. He felt that some of the rich universities have become richer by harvesting the benefits of HRD Phase – I programme of ICAR. He suggested that the number of BOM members needs to be restricted to 9-11 and some educational background/professional experience prescribed, vesting the nominations with the Chancellors. The Speaker advocated for development of strong linkage mechanism for SAUs in the form of review meetings of Deans/Directors, brain storming sessions etc. and for allocation of adequate funds to be stepped up from 0.5% to 2.0% of agricultural GDP with the Council to increase its share to 1/3 of total funding. Dr. J.C. Katyal, Deputy Director General (Education), ICAR showed his concern at the poor or proxy participation of the Vice-Chancellors of SAUs in the 28th Annual Convention of IAUA. He emphatically expressed that the representatives may accompany the Vice-Chancellors but can in no way substitute them as this affects the decision making process. The participants unanimously agreed with the view and requested president IAUA to convey these remarks to the Vice-Chancellors with the request that in future they should ensure their participation in the Annual Convention.

Dr. Katyal, discussed the implementation status of ICAR Model Act by various SAUs and remarked that the Model Act was circulated among SAUs for examination/adoption and for providing feedback on points where they had some reservations. But unfortunately, the feedback from majority of SAUs is still awaited. Thereafter, the speaker lucidly explained the broad variations between ICAR Model Act (1994) and the Acts of different SAUs and the report of Subha Rao Committee on University Governance — 2002.

Dr. S.S. Baghel, Vice-Chancellor CAU Imphal (President, IAUA) requested all Vice-Chancellors to send the necessary feedback on the Model Act on priority.

After thorough discussion, the following recommendations emerged from the session:-

- Budgetary support for agriculture education/research should be stepped up to the level of 2 per cent of Agril. GDP.
- For effective control of ICAR on SAUs the ICAR assistance to SAUs should be at least 1/3rd of the total funding including infrastructure development and IT networking within universities, amongst SAUs/ council institutes and video conferencing facilities, as well as funds for maintenance of IT infrastructure.
- For proper fund utilization, funds should be timely released and the second installment of allocated grant be released by or before November every year.
- SAUs will expedite submission of their feedback/suggestions on ICAR model Act 1994 to IAUA secretariat enabling formulation of uniform view for consideration of the Council.
- Constitution of university statutory bodies like Board of Management (BOM) and/or Executive Council (EC) and the manner of appointment of Vice-chancellor as provided in the ICAR model Act may be adopted / implemented *in toto* by SAUs.
- Nomination of BOM and/or EC members, other than ex-officio members, should vest with the Chancellor.
- Educational background/professional experience should form the basis for BOM/EC members other than ex-officio members and members drawn from the university.

- Academic Council should also include an educationist from traditional universities of the state and agro-industry based graduate from SAU as member. Likewise, the Research and Extension Councils should also include progressive farmers (Krishi Bushan/Krishi Pandit etc.) as members.
- Appointment of Registrar, Comptroller, University Engineer etc., wherever ordered by state government, should be in consultation with the concerned Vice-Chancellor.
- Decentralization of administrative/financial powers by SAUs should be undertaken on priority.
- Vice-Chancellors shall ensure their participation in annual conventions without fail.

TECHNICALL SESSION - IV

Niche Farming- a Paradigm Shift in Agricultural Development Process

K.V. Peter and B. Mohan Kumar

Kerala Agricultural University, Thrissur-680 656, Kerala, India

The challenges in agriculture for developing countries in the 21st century are enormous, particularly if there are not only to satisfy the growing demand for food, but also to help reduce effectively poverty and malnutrition, in an environmentally sustainable manner. Niche agriculture signifies a specialized production concept in small agro-ecological niches with limited supply of technological options and low effective demand for technological innovations. It represents a survival instinct, where the input-intensive agricultural system probably has lost its relevance. Examples are numerous and include medicinal and aromatic plant production, besides the production of "organics" such as spices, vegetables, fruits, ornamentals in diverse habitats. In particular, organic coffee, tea, cacao, vanilla and other specialized food products (e.g. black pepper, livestock and fish unique to the humid tropical region) could be targeted along with seeking pharmacologic and / other applications for botanical products, and even for products such as natural rubber. Broadly, the self-sustaining home garden agro-ecosystem of the humid tropics with the dual functions of production and on-farm conservation of biodiversity and the growing of genetically modified crops in some locales to surmount biotic or abiotic stresses may represent instances of niche farming. The topics also have great potential for sustainable logging, and could promote a high-return "certified" logging industry if links established with buyers.

While a majority of the niche farming systems have developed over centuries of cultural and biological evolution and represent the accumulated wisdom and experience of farmers who have interacted with adverse environment without access to external inputs, capital or scientific knowledge, others such as those involving genetically modified crops may represent new scientific innovations. Sustainability (both ecological and economic) is a fundamental attribute of these "niches", which are usually managed with locally available resources and with human/animal energy, except for the new crops. Maximisation of productivity is never targeted or attained; hence industrial crop production techniques are seldom employed. The cultivators often use 'indigenous ecological knowledge' in manoeuvring the species or their mixtures, which probably reflects their traditional 'conservation ethos'. Conservation of biodiversity (both at organism and landrace levels), thus, is an intrinsic feature of these production systems and has attracted universal acclaim.

Indeed, organic farming has become the practical alternative for those consumers who want to have choices in the marketplace for the food they eat and feed their children. Organic agriculture's dominance in the marketplace over the past decade can be closely related to the change in human attitude about their personal health perception and concern for the environment.

In seeking new agricultural products (either food and other commodities for local markets or niche products for export), it is, however, essential to start first with the market, and then work rearward up through the supply chain to the producer to determine what might be possible for a given region. Alternative development projects in the past have failed because the new products implemented plainly did not have a viable market. Thus, it calls for a shift in the development paradigm, which traditionally emphasized high-energy consumption in agriculture through intensive cultivation. Breeding of crops for specific loci and/or evolving appropriate technology packages with fewer inputs are proactive steps in this direction.

Restructuring of Education and Research for Niche Agriculture Development

Tej Paratap
CSK HPKV, Palampur

Range of land holdings from subsistent level of food production under fragile, marginal and harsh environments to large landholdings of favourable agricultural lands characterize agricultural economy of India. Sustainable production options with new economic opportunities are needed to raise farm income and employment. Critical issue, at present, is how sustained opportunities for enhancing household economy of all types of farmers under all agroecological zones can be created in India. On the one hand, India has a large land mass of plain irrigated and rainfed farming which contrasts very much in terms of agroecological conditions from the mountains, which distinguish themselves from the plains in terms of inaccessibility, fragility, marginality, diversity and niche and human adaptation mechanisms. These special upland conditions lead to the creation of different agricultural opportunities (niches) for different areas (habitats).

Niche represents the special situation where the resource base and environmental conditions create the potential for product and activities that can offer comparative advantages over other areas. Agricultural Niche can be explained as a farming opportunity offering ecological and economic comparative advantage within that agroecological zone or agricultural system or watershed or within an administrative unit. For example, range of micro-niches in mountain areas are a reflection of the diversity of natural resources and environment. Mountains have potential for small-scale, high pay-off specialized farming activities, which are potentially under-exploited due to inaccessibility and marginality. Several workers (Banskota, 1995) have emphasized the need to transform the stagnating agriculture into a dynamic one by systematically identifying and developing comparative advantages in different agro-climatic belts on a sustainable basis, which will reduce both poverty and pressures on the environment. In the past, approaches aimed at exploiting the niches basically concentrated on three aspects-agro-climatic suitability, indigenous technological knowledge (ITK) and accessibility. Productive and high pay-off crops were introduced from outside in order to capitalize on both agro-climatic niches.

Over the past two decades, many transformed areas have witnessed considerable growth both in farm income and employment leading to improved living conditions of local people. This has given a great hope to people for managing sustainable livelihoods through harnessing a variety of agricultural niches across the Indian landscape.

However, the implications of exploiting various agricultural niches under marginal and fragile mountain environments requires a better understanding of the factors and processes associated with each niche. Like, what can be the critical factors requiring proper attention while planning development of a particular agricultural niches? What will be the implications of specific niche options on the livelihood of local farmers? how such options can affect household resource allocation pattern and farm economy? What are the emerging critical issues of sustainable niche farming? What are the priority issues for agricultural education, research and HRD so as to promote niche based agricultural options across the nation or in an agro-ecological zone in a state or in an area?

This paper analyses the dimensions of niche based agriculture and challenges of restructuring agricultural education and research for promoting niche based agriculture, with special focus on mountain agriculture.

Examination of different niche based agriculture practices confirms that each practice is built around its suitability to a specific local agro-climatic niche. This common feature of all niche farming options on landscapes ranging from marginal lands to sloping terraces and flat lands.

The available information on factors and processes of agricultural niches shows that agricultural niches are subject to change both in space and time. High economic benefits induce spatial dimension to increase – a particular niche commodity spreads quickly over time. This is reflected in terms of shifts in expanded land resources or improved production. Temporal dimension of niche farming, however, is manifested in soil nutrient losses and diseases over time. It is apparent in the production.

Comparison of benefit-cost of four niche commodities suggests that those niche options introduced from outside give more economic profits in their early adoption processes. However, the inevitable constraints such as water and rapid soil nutrient deterioration could make them unsustainable in the long run unless optimal level of soil- water- nutrient is maintained.

Cases of fruit crops and vegetables indicate that plant materials from outside cannot be sustained in long run because of the lack of local capacity and capability to diversify variety options. New varieties may not be widely adopted as local varieties since these do not adapt and perform well. It is a clear indication of the fact that high productivity options, although well suited to agro-climatic conditions cannot be sustained on marginal and fragile environment in long run because the cost involved to maintain productivity offsets the benefits. Cost of inputs will be high because of inaccessibility and long distance to markets.

On the other hand options indigenous to the local ecosystems have better chance of being sustained over time because of its adaptability to local environment, although the benefits are relatively lower. If the niche farming practice is a locally adapted option climatically, environmentally and socially, only value addition makes it more promising. However, there is a risk of unsustainable processes starting once overstocking beyond the carrying capacity occurs. In such cases, positive interaction of community is needed to regulate the practice.

Niche production options contribute significantly in providing new economic opportunities to local people and appear to be sustainable in terms of farm economy and life standards. This is evident from considerable increases in expenditures (from cash income earned from niche farming) on foodgrain, education, health and clothing, with positive impact on local human resource development, health care and nutrition. Economic viability and social acceptability of niche options have been demonstrated by the fact that there has been considerable shift of farm resource (mainly land) to niche production options over the last 7 to 15 years.

However, development efforts at harnessing agricultural niches have so far only focused on agro-climatic suitability as the key consideration. Other interrelated factors like soil-nutrient and water on marginal and fragile environment have not been explored enough. This also includes local farmers' inability to sustain high-input management practices. Technologies developed in lowland conditions, without considering marginal and fragile mountain landscape, cannot be sustained in longer period on mountain landscape. This is because such technologies exhaust soil nutrients rapidly and long-term results cannot be expected without replenishing the nutrients through fertilizer application. Further, because of inaccessibility and long distance to market, it becomes expensive to use external inputs off-setting the benefits. The marginal and fragile environments cannot sustain high pay off or productive technologies which have performed well in favourable lowland environment. These environments need a separate research and development agenda to address the problems and issues in order to sustain specific livelihoods of people living in those areas.

For promoting niche based agriculture, agricultural education and research needs to be restructured to make it dynamic and capable of evolving new options, which are ecologically stable and economically desirable.

DICUSSIONS

Prof. Anwar Alam, Vice-Chancellor SKUAST-K, Srinagar made a detailed presentation on the topic and highlighted the importance of niche agriculture and required academic orientation. Initiating the discussion, Dr. S.S. Magar, Vice-Chancellor KKV Dapoli, remarked that so far we have struggled for increased productivity. But since more than 60% post harvest losses in fruits occur, we have to focus on post harvest technology and value addition. Dr D.P. Singh, Vice-Chancellor JNKVV Jabalpur, said that soybean, chickpea, lentil, onion and garlic have been ecologically the optimal crops for Madhya Pradesh but ICAR was not funding on these crops. Dr. Mishra, Dean College of Forestry YSPUAFH Solan, appreciated the idea of niche farming especially for hills and far off states which could specialize and excel in one or the other niche crop. Dr. R.P. Singh, Executive Secretary IAUA, gave an account of crop belts and cropping sequences in increasing production and farm income. Dr. Varghese, MRPUAT Udaipur, said that about 50 lakh ha of land were under cultivation of bajra, moth and cluster bean in Rajasthan and could therefore be taken as niche crops for the area. Dr. Faroda, Chairman ASRB, remarked that keeping in view the globalization and competition in international market, each ICAR institute/SAU should have at least one niche crop. Dr. Pamatama Singh, Vice-Chancellor RAU Bikaner, opined that niche farming is area specific and has many economic advantages. He further said that all aspects – production, processing and marketing – need to be addressed for the niche crop as is being done in Rajasthan for milk. Dr. Senapati, Vice-Chancellor OUAT Bhubaneswar, agreed that suitable areas for production of niche crops need to be identified and agro processing and marketing addressed. Dr. Chundawat, Vice-Chancellor SKDUAT Gujrat, remarked that so far we have been growing everything everywhere without taking in to account the suitability of the area to the farming. He emphasized upon end to end approach for raising the niche crops. Dr. A.K. Pathak, Vice-Chancellor Assam Agri. University Jorhat, remarked that sometimes cultivation of new crops is thrust upon and that department of agriculture also needs to be consulted for the purpose. However, Dr. N. Sharma, Director NDRI Karnal, said that even though niche agriculture was wonderful, no one can stop the grower from what he wants to grow. After thorough discussions following broad recommendations emerged:-

- Each agro-ecology is best suited for a few crops and commodities. Niche crops and commodities should be identified by each SAU and focussed in their academic programme, besides issues of food and feed security.
- Niche agriculture should be in harmony with utilization of natural resources and interests of farmers, and should ensure economic sustainability.
- The approach to niche crops and commodities be holistic covering production, processing and utilization related trade IPR, entrepreneurship, up-stream and down-stream support systems.
- SAUs and development departments should liaise to realize the economic potential of niche agriculture for domestic as well as export markets.
- ICAR and IAUA should identify niche crops and commodities in cooperation with SAUs.
- Every SAU should try to emerge as support Centre of Excellence in its niche crops and commodities. ICAR should recognize it and accordingly provide support.

RECOMMENDATIONS

Technical Session - I
(Employment Orientation to Agricultural Education)

- 1.01 Present mind-set of graduates of agriculture and allied fields towards seeking employment needs to be diverted to employability and self-employment. Agriculture education should prepare students in knowledge and skills capable of converting rural based strategic opportunities into employment, addressing all its facets.
- 1.02 SAUs' faculty should upgrade itself with communication technology, agri-business, post harvest technology and agro-processing activities, education methodology, e-learning and entrepreneurship in respective field, and the opportunities created to train and upgrade competence.
- 1.03 Employment opportunities are shrinking in public sector. On the other hand, employment in private sector is growing. Agricultural graduates naturally should be developed with skills, self-competence and self-confidence, with spirit of continued learning. Hence agricultural education be revitalized and re-engineered to meet the demand-driven private sector requirements of specialized skills of biotechnology, information, mechanization, automation, post harvest technology and value addition, e-commerce and e-learning while simultaneously moulding the minds of students away from white-collared jobs towards entrepreneurship and scientific farming.
- 1.04 Every SAU should try to harness agro-climatic niche by devising specialized courses and expertise in production, processing, packaging and marketing of niche crops and commodities and acquire capacities to become Centres of Excellence for identified niche crops.
- 1.05 It is necessary to include animal husbandry, fisheries and forestry and agri-business along- with the major courses in agriculture education system in order to enable agricultural graduates think for diversified agriculture and to enable them help the farmers who practise mixed farming.
- 1.06 Activities, that have created employment, should be identified, documented and education imparted in these areas. Non-degree training programmes based on market preference and local requirements could be instituted.
- 1.07 Central / State governments be requested to provide, soft loans to graduates in all disciplines of agricultural science (Agriculture, Horticulture, Forestry, Fisheries, Agric. Engineering, Veterinary, Home Sciences etc.) for promotion of self employment on the lines of NAAS recommendations. Women employment in post-harvest technology could also be considered.
- 1.08 Only agricultural graduates should be authorized to deal in sales and supplies of agricultural inputs such as fertilizers, pesticides, seeds and planting material, farm machinery etc.
- 1.09 SAUs should be equipped to train through distance education the rural school dropouts so as to reach the un-reached especially women leading to adoption of new technologies resulting in higher productivity in ecologically sustainable manner in agri-business, agro- servicing etc.

Technical Session - II

(Pros and cons of Private Agriculture Education)

- 2.01 Private agricultural colleges need to be improved and brought under the umbrella of Accreditation Board of ICAR for providing financial assistance.
- 2.02 *Modus operandi* for private agricultural colleges in the country need to be worked out to integrated them with SAUs to ensure high quality of agricultural education.
- 2.03 Private colleges should meet the norms and accreditation standards for quality assurance in agriculture education.
- 2.04 Privatization of higher education in agriculture should be with the spirit of social service and not for money-making (commercialization).
- 2.05 The establishment of new SAUs / private colleges should be allowed after prior approval of ICAR subject to the condition that sound financial resources are available and there is a sustained need for such an institution.
- 2.06 Distance Education cannot give and assure requisite skills and practical training in agriculture which is the growing need. It may serve the purpose in subjects not involving practical like Agri-business Management, Economics, Sociology etc.
- 2.07 A sub-committee was constituted to prepare the Draft Policy for control of admissions, improvement in examinations / evaluation system and invigilation of examinations, course curricula and mechanism for affiliation of private colleges with SAUs. The sub-committee comprises of Prof. Anwar Alam (Vice-Chancellor, SKUAST-K, Srinagar) as Chairman and five Vice-Chancellors of SAUs (Prof. S.N. Puri, MPKVP Rahuri; Prof. C. Ramaswamy, TNAU Coimbatore; Prof. Parmatma Singh RAU Bikaner; Prof. P.L. Gautam, GBPUAT, Pant Nagar; Dr. S.S. Magar, DBS KKVP Dapoli) as Members. Executive Secretary IAUA shall function as Member Secretary and DDG (Education), ICAR, as Consultant.

Technical Session - III

(SAU Model Act Implementation)

- 3.01 Budgetary support for agriculture education / research should be stepped up to the level of 2 per cent of Agril. GDP.
- 3.02 For effective control of ICAR on SAUs the ICAR assistance to SAUs should be at least 1/3rd of the total funding including infrastructure development and IT networking within universities, amongst SAUs / council institutes and video conferencing facilities, as well as funds for maintenance of IT infrastructure.
- 3.03 For proper fund utilization, funds should be timely released and the second installment of allocated grant be released by or before November every year.
- 3.04 SAUs will expedite submission of their feedback / suggestions on ICAR model Act 1994 to IAUA secretariat enabling formulation of uniform view for consideration of the Council.

- 3.05 Constitution of university statutory bodies like Board of Management (BOM) and / or Executive Council (EC) and the manner of appointment of Vice-chancellor as provided in the ICAR model Act may be adopted / implemented *in toto* by SAUs.
- 3.06 Nomination of BOM and / or EC members, other than ex-officio members, should vest with the Chancellor.
- 3.07 Educational background / professional experience should form the basis for BOM / EC members other than ex-officio members and members drawn from the university.
- 3.08 Academic Council should also include an educationist from traditional universities of the state and agro-industry based graduate from SAU as member. Likewise, the Research and Extension Councils should also include progressive farmers (Krishi Bushan / Krishi Pandit etc.) as members.
- 3.09 Appointment of Registrar, Comptroller, University Engineer etc., wherever ordered by state government, should be in consultation with the concerned Vice-Chancellor.
- 3.10 Decentralization of administrative / financial powers by SAUs should be undertaken on priority.
- 11.11 Vice-Chancellors shall ensure their participation in annual conventions without fail.

Technical Session - IV **(Niche Agriculture & Required Academic Orientation)**

- 1.01 Each agro-ecology is best suited for a few crops and commodities. Niche crops and commodities should be identified by each SAU and focussed in their academic programme, besides issues of food and feed security.
- 1.02 Niche agriculture should be in harmony with utilization of natural resources and interests of farmers, and should ensure economic sustainability.
- 4.03 The approach to niche crops and commodities be holistic covering production, processing and utilization related trade IPR, entrepreneurship, up-stream and down-stream support systems.
- 4.04 SAUs and development departments should liaise to realize the economic potential of niche agriculture for domestic as well as export markets.
- 4.05 ICAR and IAUA should identify niche crops and commodities in cooperation with SAUs.
- 4.06 Every SAU should try to emerge as support Centre of Excellence in its niche crops and commodities. ICAR should recognize it and accordingly provide support.

APPENDICES

Programme of 28th Annual Convention of IAUA

28-6-2004	1300-1330 hrs.	Arrival of delegates at Srinagar Airport and departure to Govt. Circuit House Srinagar, Hotel International Sonwar and Hotel Le Meridien Rajbagh.
	1400 hrs.	LUNCH (at respective places of stay)
	1600 hrs.	Departure from respective places of stay
	1615 hrs.	To Assemble near Nehru Park
	16:15-18:15hrs.	Visit to Shankaracharya Temple and Mughal Gardens
	18:20 hrs.	Tea
	19:00-20:00 hrs	Cultural Programme
	20:00 hrs.	Dinner (University Lawns Shalimar)
	2130 hrs.	Departure for respective places of stay (govt. Circuit House Srinagar, Hotel International Sonwar and Hotel Le Meridien, Rajbagh)
29-06-2004		Venue: International The Grand Palace, Cheshmashahi, Srinagar
INAUGRAL SESSION		
10:05-10:07 hrs.	Invocation Song	Students of FOA, Wadura, Sopore
10:07-10:10 hrs.	Presentation of Bouquets	
10:10-10:20 hrs	Welcome Address	Dr. S.S. Baghel, Vice – Chancellor, CAU, Imphal & President – IAUA
10:30-10:45 hrs	Address	Dr. Mangla Rai, Secretary DARE, GOI & Director General, Indian Council of Agriculture Research, New Delhi (Guest of Honour)
10:45-10:55 hrs	Address	Jenab Abdul Aziz Zargar, Hon’ble Minister of Agriculture & Cooperatives, Govt. of J&K
10:55-11:15 hrs	Address	Jenab Mufti Mohammad Sayeed, Hon’ble Chief Minister, J&K (Pro- Chancellor, SKUAST-K)
11:15-11:20 hrs	Release of SKUAST –K Publications	
	1. Annual Report 2003-04 of SKUAST-K by HE Lt. Gen (Retd.) S.K. Sinha, the Governor, J&K (Chancellor, SKUAST-K)	

2. Proceedings of National Symposium on Sustainable Live Stock Development by Jenab Mufti Mohammad Sayeed, Hon'ble Chief Minister, J&K (Pro-Chancellor, SKUAST-K)
3. Catalogue of Released varieties of SKUAST-K by Dr. Mangla Rai, Secretary DARE, GOI and Director General, Indian Council of Agricultural Research, New Delhi

11:20-11:40 hrs	Inaugural Address	HE Lt. Gen. (Retd.) S.K. Sinha, PVSM, The Governor, J&K State (Chancellor, SKUAST-K)
11:40-11:45 hrs.	Vote of thanks	Shri. H.U. Khan, Vice-Chancellor, SKUAST-J
11:45-12:00 hrs.	Tea Break	

TECHNICAL SESSION – I : Employment Orientation to Agricultural Education

29-6-2004 (12:00-13:30 hrs)

Chairman	:	Dr. Mangla Rai, Secretary DARE & Director General, ICAR
Co- Chairman	:	Dr. S.S. Magar, Vice-Chancellor, KKV, Dapoli
Rapporteurs	:	Dr. Mushtaq Ahmad, HOD, Pl. Pathology, SKUAST-K
Key Note Speakers	:	<ol style="list-style-type: none"> 1. "Reorientation of Agricultural Education Towards Future Needs and Opportunities" - Dr Anwar Alam, Vice-Chancellor, SKUAST-K 2. "Employment Orientation to Agricultural Education in India" – Dr. R.P. Singh, Vice-Chancellor, MPUAT, Udaipur 3. "Strengthening of PG Education in Agriculture" – Dr. D.P. Singh, Vice-Chancellor, JNKVV, Jabalpur 4. "Employment Orientation to Agriculture Education" – Shri H. U. Khan, Vice- Chancellor, SKUAST-J, Jammu

13:30-14:30 hrs : **LUNCH Venue: Intercontinental The Grand Palace, Cheshmashahi, Srinagar**

TECHNICAL SESSION – II : Pros and cons of Private Agricultural Education

29-6-2004 (14:30-16:00 hrs)

Chairman	:	Dr. A.S. Faroda, Chairman, ASRB, New Delhi
Co- Chairman	:	Dr. M.P. Yadav, Director, IVRI, Izatnagar
Rapporteurs	:	Dr. A.Q. Jhon, DRI, SKUAST-K

- Key Note Speakers : 1. "Pros and Cons of Private Agricultural Education in India – A special Reference to Chhattisgarh State"- Dr. C.R. Hazra, Vice-Chancellor, IGKV, Raipur
2. "Revamping Private Higher Agricultural Education in Uttar Pradesh" - Dr. B.B. Singh, Vice-Chancellor, NDUAT, Faizabad
3. "Privatization of Agricultural Education" – Dr. V.M. Parwar, Vice-Chancellor, MAU, Maharashtra
4. "Knowledge For Development" – Shri R.K. Dwivedi, Manager, CABI, (India office), New Delhi

16:00-16:15 hrs : **TEA BREAK**

TECHNICAL SESSION – III : SAU Model Act implementation

29-6-2004 (16:15-17:45hrs)

Chairman : Dr. J.C. Katyal, DDG (Edu.), ICAR, New Delhi

Co- Chairman : Shri. H.U. Khan, Vice-Chancellor, SKUAST-J

Rapporteurs : Dr. M. A.Kirmani, PP&MO, SKUAST-K

- Key Note Speakers : 1. "Governance of Agricultural Universities" – Dr. S.S. Magar, Vice- Chancellor, KKV, Dapoli
2. "Model Act for State Agricultural Universities – Implementation Status" – Dr. J. C. Katyal, DDG (Edu.) ICAR

17:45-19:30 hrs : Local Sight Seeing

2000-21:00 hrs : Dinner (Venue: JKTDC Restaurant, Chemhmashahi, Srinagar)

2100 hrs : Departure to Circuit House / Hotel International / Hotel Le meridian

30-06-2004 9:30 hrs : Departure for Gulmarg

TECHNICAL SESSION – IV : Niche Agriculture and Required Academic Orientation

Venue: Hotel Highland Park, Gulmarg

30-06-2004 (11:30-13:30 hrs)

Chairman : Dr. S. A. H. Abidi, Member, ASRB, New Delhi

Co- Chairman : Dr. Anwar Alam, Vice-Chancellor, SKUAST-K

Rapporteurs : Dr. Shafiq A. Wani, Prof. & Head (PBG), SKUAST-K

- Key Note Speakers : 1. "Restructuring of Education and Research for Niche Agriculture Development"- Dr. Tej Partap, Vice-Chancellor, CSKHPKV, Palampur
2. "Niche Farming- a Paradigm Shift in Agricultural Development Process" – Dr. K.V. Peter, Vice-Chancellor, Kerala Agri. University, Kerala.
3. Dr. B.R. Sharma, IWMI, New Delhi

PLENARY SESSION

Chairman	:	Dr. S.S. Baghel, Vice-Chancellor, CAU, Imphal (President, IAUA)
Co- Chairman	:	Dr. Anwar Alam, Vice- Chancellor, SKUAST-K, Srinagar
Rapporteurs	:	Dr. M.A. Kirmani, PP&MO, SKUAST-K
14:15-14:15 hrs	:	Welcome by Vice-Chancellor, SKUAST-K
14:17-14:20 hrs	:	Opening Remarks of the Chairman
14:20-14:50 hrs	:	Presentation and the Recommendations by Chairman / Raspporteurs of the technical Session
14:50-15:10 hrs	:	Address of the Chairman
15:10-15:15 hrs	:	Vote of thanksi. Dr. G.M. Wani, Director Extension Education, SKUAST-Kii. Dr. R.P. Singh, Executive Secretary, IAUA
15:15-17:00 hrs	:	Sight seeing at Gulmarg
17:00 hrs	:	Departure from Gulmarg
18:30-19:30 hrs	:	Arrival at Govt. Circuit House, Srinagar, Hotel International, Sonwar, and Hotel Le Meridien, Raj Bagh
19:30 hrs	:	Departure from Govt. Circuit House, Srinagar, Hotel International, Sonwar and Hotel Le Meridien, Raj Bagh to University Lawns
20:00 hrs.	:	Dinner (Venue: University Lawns, Shalimar)

01-07-2004

09:00 hrs	:	Departure from Govt. Circuit House, Srinagar, Hotel International, Sonwar and Hotel Le Meridien, Raj Bagh
09:15-10:30 hrs	:	Shikara ride in Dal Lake
10:30-11:30 hrs	:	Visit to SKUAST-K, Shalimar
11:30-11:45 hrs.	:	Tea at SKUAST-K, Shalimar
11:45 hrs.	:	Departure for Airport

Participants of 28th Annual Convention of IAUA

1.	Dr. Mangala Rai	Secretary DARE & Director General, ICAR, New Delhi
2.	Dr. A.S. Faroda	Chairman, Agricultural Scientists Recruitment Board, KAB, New Delhi -110 012
3.	Dr. J.C. Katyal	Dy. Director General (Edu.) ICAR, Krishi Anusandhan Bhawan-II, New Delhi -110 012
4.	Dr. S.A.H. Abidi,	Member, Agricultural Scientists Recruitment Board, ICAR, New Delhi -110 012
5.	Dr. S.S. Baghel	Vice-Chancellor, Central Agricultural University, Iroisemba, P.O. 23 Lamphel, Imphal -795 001 (Manipur)
6.	Dr. S.S. Magar	Vice-Chancellor, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Distt. Ratnagiri, Maharashtra
7.	Dr. V.M. Pawar	Vice-Chancellor, Marathwada Agricultural University, Parbhani - 431402, Maharashtra
8.	Dr. R.P. Singh	Executive Secretary IAUA, NASC, PUSA Campus, New Delhi - 110 012
9.	Prof. Parmatma Singh	Vice-Chancellor, Rajasthan Agricultural University, Bikaner, Rajasthan
10.	Dr. Bhagirathi Senapati	Vice-Chancellor, Orissa University of Agri. & Technology, Bhubaneswar - 751003 (Orissa)
11.	Dr. M.N. Sheelavantar	Vice-Chancellor, University of Agricultural Sciences, Bangalore, Karnataka
12.	Dr. A.K. Pathak,	Vice-Chancellor, Assam Agricultural University, Jorhat, Assam
13.	Dr. B.S. Chundawat,	Acting Vice-Chancellor, Sardar Krushinagar Dantiwadsa Agricultural University, Sardarkrushinagar, Guajrat
14.	Dr. R.P. Singh	Vice-Chancellor, Jawaharlal Nehru Krishi Vishwavidhyalaya, Jabalpur, Madhya Pradesh
15.	Dr. Nagendra Sharma	Director, National Dairy Research Institute, Karnal-132001 (Haryana)
16.	Dr. H.U. Khan	Vice-Chancellor, SKUAST-J, Jammu
17.	Prof. Anwar Alam	Vice-Chancellor, SKUAST-K, Shalimar, Srinagar - 191 121 (Kashmir)
18.	Dr. A.P. Sharma	Vice-Chancellor, G.B. Pant University of Agriculture & Technology, Pantnagar, Uttranchal
19.	Dr. V.K. Mishra	Dean, College of Forestry, Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni, Solan, Himachal Pradesh
20.	Shri. R.K. Dwivedi	Manager, CAB International, CG Marg, Pusa Campus, New Delhi
21.	Dr. K.A. Varghese,	I/C Assoc. Director, Maharana Pratap University of Agriculture & Technology, New Campus, P.B. No. 171, Udaipur - 313001
22.	Dr. B.N. Verma	Registrar, Rajendra Agricultural University, Pusa, Samastipur

Various Committee Associated with the conduct of 28th Annual IAUA Convention

-
- I. • Organizing Committee:**
- Dr. S.S. Baghel, President, IAUA
 - (ViceChancellor, CAU, Imphal)
 - Prof. Anwar Alam, Vice-Chancellor, SKUAST-K
 - Jenab H.U. Khan, Vice-Chancellor, SKUAST-J
 - Dr. R.P. Singh, Executive Secretary, IAUA
 - Prof. G.M. Wani, Director Extn. Education
 - Prof. M.H. Shah, Director Research
 - Dr. M.Q. Jhon, Director Resident Instruction
 - Dr. M.A. Kirmani, PP & MO
 - Dr. S.S. Hussain, Dean Faculty of Vety. Science & AH
 - Dr. M.A. Gora, Registrar
 - Haji M.A. Dar, Comptroller
 - Er. Vikas Ahmad, Estate Officer
- II. Reception/Registration Committee:**
- Dr. Shafiq Ahmad Wani, Prof. & Head, Division of Plant Breeding & Genetics
 - Dr. Sheikh Bilai, Professor, Entomology (ICKVK ETC, Malangpora)
 - Dr. M.M. Willayat, Head, Division of Vety. Public Health, EVSc & AII
 - Dr. Gul Zaffar, Associate Professor, Division of Plant Breeding & Genetics
 - S. Harnam Singh, Dy. Comptroller, Head quarter
 - Mr. Parvez Ahmad, PRO
- III. Boarding/Lodging/Transport Committee:**
- Dr. Nazir Ahmad, Prof. & Head, Division of Olericulture
 - Dr. M.A. Khan, Prof. & Head, Division of Forestry
 - Dr. F.A. Mattoo, Associate Director Research
 - S. Harnam Singh, Dy. Comptroller, H.Q.
 - Dr. M.Y. Zargar, Assoc. Prof, Division of Env. Sciences
 - Dr. Ab. Hai, Assistant Prof. (Vety. Ext. Education), FVSc & AH
 - Er. V. Ahmad, Estates Officer (I/c)
- IV. Editorial Committee**
- Dr. M.A. Teli, Prof. & Head, Div. of Plant Pathology
 - Mr. K.D. Farooqui, Dy. Director (Research) Div. of Pomology

