

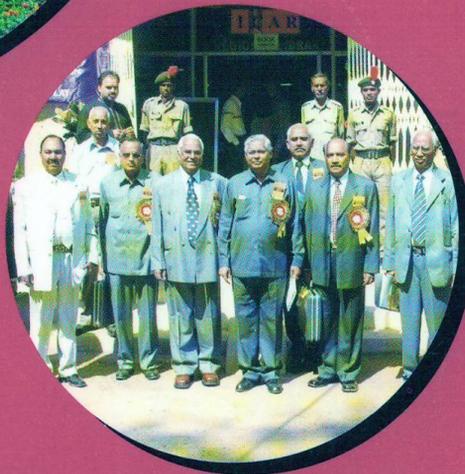
Proceedings

Second National Symposium

on

Agricultural technological backstopping through education and training for self-employment

(10-11 November, 2005)



Organizers

Indian Agricultural Universities Association (IAUA)

&

Indira Gandhi Agricultural University
Raipur 492 001 (Chhattisgarh)



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Editors:

Dr. A.S.R.A.S. Sastri
Director of Research

Dr. V. S. Trimurthy
Director of Instruction, IGAU
& Nodal Officer, IAUA

Shri Sanjay K. Dwivedi
Asstt. Director (D&S)/Scientist

Shri Diwakar Naidu
Research Associate

**Proceedings of the
Second National Symposium
on
Agricultural technological backstopping
through education and training for self-employment**

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Venue

**Indira Gandhi Agricultural University
Raipur 492 001 (C.G.)**

Organizers

Indian Agricultural Universities Association (IAUA)

&

**Indira Gandhi Agricultural University
Raipur 492 001 (C.G.)**

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इंदिरा गांधी कृषि विश्वविद्यालय

कृषक नगर, रायपुर 492 006 (छत्तीसगढ़) भारत

INDIRA GANDHI AGRICULTURAL UNIVERSITY

Krishak Nagar, Raipur 492 006 (Chhattisgarh) INDIA

Phone :91-771-2443419 (O)

:91-771-2443008 (R)

Fax : 91-771-2442302,

2442131

e-mail : hazracr@yahoo.co.in

डॉ. सी. आर. हाजरा

कुलपति

Dr. C.R. Hazra

Vice-Chancellor



FOREWORD

The population of India has already been crossed 103 billion and is still increasing alarmingly and that exerts a great pressure on the food grain production in the country. On a rough reckoning it is an acceptable fact that India achieved a marvelous success in food grain production from a bare 51 million tons in 1951-52 to 212 million tons in 2003. Now there is a growing demand, not only for producing additional 50 million tons of food grain by 2010 AD to feed the increasing population but also for generating rural employment through agriculture and allied fields. This situation poses a major challenge both for the policy makers as well as to the agricultural scientists and extension personnel to make necessary modifications in agricultural education and training.

The higher education especially rural youth capacity building is pivotal for the development of agriculture and has the potential of providing innovative technologies, higher scientific aptitude, higher education up-liftment and developing need-based specific syllabus for technological intervention. The farmer has to meet the challenges of agriculture and add value to the agricultural economy. In addition to these, agricultural education will have to have some specific objectives to improve productivity of land and labour engaged in agriculture, train the farmers to improve their capability to acquire new knowledge and adapt them effectively. Further, it should help in promoting economic development, opening new opportunities for employment, facilitating new change and democratic growth which the nation has decided as its basic goal. The theme of the National Symposium "*Agricultural technological backstopping through education and training for Self-employment*", is timely and relevant. In this contest, the Indian Agricultural Universities Association (IAUA) has rightly decided to organize a National Symposium on the above theme and chosen Indira Gandhi Agricultural University, Raipur as its venue and the symposium was held on 10-11 November, 2005 at Raipur, Chhattisgarh. .

This publication consists of the significant points, recommendations and some of the papers submitted on different themes of the symposium. I am sure that the recommendations would be very useful. I hope that the Association will take up these recommendations with the concerned Ministries, Departments and other Organizations to ensure further follow-up action.

I express my appreciation for the contributions made by various working committees and office bearers of IAUA and Professors/Scientists (specially Dr. A.S.R.A.S. Sastri, Organizing Secretary of the National Symposium) and staff of Indira Gandhi Agricultural University for organizing the event of national symposium.

(C.R. Hazra)

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PROGRAMME

Date: 10 November 2005

Registration : 9.00 -10.00 am
Inauguration : 10.00 -11.30 am

Tea/Coffee Break (11.30am -12.00 noon)

Presidential address : 12.00 noon 12.30 am

Technical Programme coordination: Dr. V.S. Trimurthy, Prof and Head, Dept. of Plant Pathology and IAUA, Nodal Officer, IGAU, Raipur

Technical Session

Theme I : **Agricultural education policy in the country**
(12.30 pm to 2.00 pm) Chairman : Dr. N. Balaraman, V.C., TNVASU, Chennai
Rapporteur : Dr. J.S. Urkurkar, IGAU, Raipur

Lunch Break (2.00-3.00 pm)

Theme II : **Remolding of courses for self employment generation**
(3.00-4.30 pm) Chairperson : Dr. S. S. Baghel, VC, AAU, Jorhat
Rapporteur : Dr. D.J. Phophaley, IGAU, Raipur

Theme III : **International of higher education in agriculture in the Context of GATT**
(4.30-6.00 pm) Chairman : Dr. D.K. Bagchi, VC, BCKV, Mohanpur
Rapporteur : Dr. M. P. Thakur, IGAU, Raipur

Date : 11 November, 2005

Theme IV : **Vocational courses in upcoming and export oriented fields in Agriculture**
(9.30 -11.00 am) Chairperson : Dr. S.N. Puri, VC, CAU, Manipur
Rapporteur : Dr. S.S. Rao, ADR, IGAU, Raipur

Theme V : **Standardisation and uniformity in course curricula in agriculture and allied sciences**
(11.15-12.15 noon)

Theme VI : **Industry -SAUs linkage from agro-processing, marketing and employment**
(12.15-12.45 noon)

- Theme VII** : **Agri-clinic and Agro-business**
 (1:00-1:30) Chairperson : Dr. H.C. Mishra, NDUAT, Faizabad
 Rapporteur : Dr. G. K. Shrivastava, IGAU, Raipur
- Theme VIII** : **Private Extension System**
 (2.30-3.30) Chairman : Dr. C.R. Hazra, VC, IGAU, Raipur
 Rapporteur : Dr. S.B. Verulkar, Scientist, IGAU, Raipur
- 3.30-4.30pm : Panel Discussion
- 4.30-5.30pm : Closing Ceremony

INAUGURAL SESSION

Inaugural session of the National symposium was held on 10 November, at 10 AM in the Auditorium of the College of Agriculture, IGAU, Raipur. Dr. S.N.Puri, Vice-Chancellor, CAU, Manipur, Imphal and President, IAUA and Chairman, National Organizing Committee was the Chief Guest for the inaugural session. Dr. C.R. Hazra presided over the function as Chairman of the Local Organizing Committee. Dr. R.P. Singh, Executive Secretary IAUA and Secretary, National Organizing Committee, Dr.A.S.R.A.S. Sastri, Director Research, IGAU and Organizing Secretary and Dr. V.S. Trimurthy, Nodal Officer, IAUA were also present on the Dias during the Inaugural Session. Among the other guests of honour Vice-Chancellors, Deans and Directors from various State Agricultural Universities and Deemed Universities were also present in the inaugural function.

Inaugural session was started with lighting of lamps by the Hon'ble Guests and *Saraswati Vandana* by the IGAU, students. On behalf of local organizing committee, Dr. A.S.R.A.S. Sastri, welcomed all the dignitaries, participants and guests to the soil of Chhattisgarh and brief about the various themes of the symposium. Dr. C.R. Hazra, Chairman, delivered the inaugural address to the gathering and emphasized about the importance of the national symposium in the context of the main theme. On behalf of IAUA, Dr. R.P. Singh also welcomed all the dignitaries and participants of the Symposium and briefed the gathering about the different activities of the IAUA.

Dr. S.N. Puri, President, IAUA and Chief Guest of the function has delivered inaugural address. Dr. Puri said that the existing agricultural education system is already delivering the desired results, but he emphasized the need for making strong delivery system by giving more importance on practical aspects. He emphasized the need for developing adequate infrastructure facilities to meet the demand of increasing number of agricultural students and improve the existing RAWE programme of under-graduate students. He also advised for strengthening research activities in the areas of seed production, rain water conservation, soil management, bio control, home science, vermi compost, hybrid seed production etc.

At the end the of the inaugural session, Dr. V.S. Trimurthy, Nodal Officer of IGAU at IGAU, gave vote of thanks to all the distinguished guests and participants of the National Symposium for coming to Raipur. He also thanked all the committee and staff members of IGAU for making this event successful.

Proceedings



SUB-THEME I

Agriculture Education Policy in the Country

Chairman : Dr. N. Balaraman, Vice-chancellor, TNVASU, Chennai

Rapporteur : Dr. J.S. Urkurkar, Professor, Dept. of Agronomy, IGAU, Raipur

Two papers were presented during this session. First paper was presented by Dr. Sudhakar Jogi, Dean College of Veterinary Science and Animal Husbandry, Anjora, Durg, on agriculture education-emerging challenges and possible solutions. He opined that agriculture education is different from normal education hence, it should be value added in terms of improving productivity, training to farmers and new opportunities of employment of graduates. He enlisted the problems of agricultural education like least preference agriculture stream by students, preferences of urban based courses rather than village need, lack of uniform course curriculum without focus on regional problems, inadequate emphasis to livestock, forestry, fisheries, high value crops etc. He has also given suggestions for improvement in agriculture education viz. establishment of mountain agriculture and research system, involvement of public and private sectors, introduction of courses of high employment potential, increase in financial support from government.

Second presentation was made by Dr. G.S. Dubey, Director of Research and Dean P.G. studies, BAU, Ranchi. Dr. Dubey discussed the issues for improvement in agriculture education and given the following suggestions.

1. Opinion of employment agencies like banks, industries, NGOs etc. should be obtained for revising the course curriculum.
2. Uniformity in semester calendar, admission policies, evaluation and grading system etc. should be ensured among SAUs.
3. NET should be made compulsory for faculty appointment and methods be evolved to ensure horizontal movement of faculty members from one institution to other.
4. Uniformity in development of infrastructure needs to be maintained among SAUs.

5. Some SAUs were funded under HRD for training of faculties. Other SAUs should also be similarly funded.
6. Introduction of agriculture as subject at primary level of education in graded manner and after matriculation interest of the students may be assessed. Only brilliant students should be allowed for degree programme and others to vocational course/training.

After the presentation, Dr. N. Balaraman, Vice-chancellor, TNVASU and chairman of the session, Dr. S.N. Puri, Vice-Chancellor, CAU, Manipur and chairman-IAUA, Dr. S.S. Baghel, Vice-Chancellor, AAU Jorhat, Dr. D.K. Bagchi, Vice-Chancellor, BCKV Mohanpur, Dr. A.S.R.A.S. Sastri, Dean Faculty of Agriculture, IGAU, Raipur, Dr. P.K. Mahapatra, Dean OUAT, Bhubaneshwar, Dr. N.C. Patel, Dean COAE & T, Junagarh and Dr. R.B. Sharma, Director Extension, IGAU Raipur took part in the discussions and suggested the policy issues for improvement in agriculture education. The session ended with thanks giving remarks by the chairman.

SUB-THEME II

Remolding of Course Curricula for Self-employment Generation

Chairman : Dr. S.S. Baghel, V.C., AAU, Jorhat

Rapporteur : Dr. D.J. Pophaly, Prof & Head, Dept. of Entomology, IGAU,
Raipur

Keynote speech : Dr. S. N. Puri, V.C., CAU, Manipur

There was one keynote address by Dr. S.N. Puri, V.C., CAU, Manipur as well as President IAUA.

Dr. Puri is of opinion that there is no hurry to change the entire syllabus because the present syllabus was revised just 3-4 years ago. The existing system is also delivering successful output and therefore the only thing is that there must be a strong delivery system through giving more emphasis on practical aspect. As the intake of number of students is increasing the infrastructure and other equipment's/apparatus/chemicals must be made available in adequate to student independently. This will be helpful in building of confidence in students. Detection in the classroom from notes must be discourage.

Graduate coming up after degree programme must face the challenges to solve the problems. This building of confidence is only possible through strengthening the RAWE programme & its duration extending from 6 month to 1 year.

He also emphasis to create the specialization on following course:

- Seed Production
- Rain water conservation
- Soil management
- Bio control
- Home science
- Vermicompost
- Hybrid seed production

Production of planting materials of horticulture crops & establishment of mother garden in the University.

In the context of W.T.O. food processing is to be strengthen simultaneously. He also emphasized for the introduction of marketing tricks for own produce. Like fruits, vegetable & other commodities. Student should also go agri. business and more emphasis should be given in extension and Economics.

He emphasized to establish a centre for frontier knowledge to train the teachers. Disaster management i.e. earthquake, flood, drought must be included, because after every disaster, agriculture suffers badly. Therefore, this management must be take care in the course syllabus.

He pass the remark on biotechnological programme that still so for no product is available in public sector. Therefore agriculture student must also be well versed with Biochemistry and Biotechnology to increase the scope of this science in public sector. In the present situation this science in only restricted to the students of Basic science student only.

He also timely pointed out to crate a law faculty to know about trade system in national & international level market level.

Less interest is shown by the student in home science, therefore the concept should be modified with inclusion of fashion technology in Home science.

Dr. K. Chandrasekhara Rao, Director Extension ANGRAU, Hyderabad & Dr. R.C. Borah Dean AAU, Jorhat also emphasized to strengthen the course curriculum an bio diversity specially taxonomic position of plants insects, nematodes microbes etc. Session was over with the vote of thanks by nodal officer Dr. V.S. Trimurthy.

Recommendation:

1. There is no hurry to modify the entire syllabus.
2. Confidence building in students is possible through only practical knowledge delivery system.
3. RAWE Extended to 1 year.

4. Law faculty is crated in the context of WTO.
5. Centre for frontier knowledge shall be establishes to impart training to teachers.
6. Centre for Biodiversity shall open for taxonomic position position/identification of plants, insects, nematodes etc.
7. Disaster management courses included.
8. Specialized/elective subjects/topic viz. Soil management's Bio-control, Biodiversity economics, Hybrid seed production, poultry and fisheries in B.Sc. Agril. Course.
9. Sufficient infrastructure, and practicals must be straighter by way of providing equipment's, apparatus, chemicals, micro sups, independently to each students to buildup confidence.

SUB-THEME III

Internationalization of Higher Education in Agriculture in the Context of GATT

Chairman : Dr. D.K. Bagchi, V.C. BCKV, Mohanpur

Rapporteur : Dr. M.P. Thakur, Principal Scientist (Plant Pathology), IGAU, Raipur

The Technical Session III on sub-theme III was held on 10th November, 2005 in which only one paper by Dr. A.S.R.A.S. Sastri, Dean, College of Agriculture, Raipur was presented. Dr. Sastri highlighted the scope and needs of Internationalization of higher education in agriculture. His views expressed on the topic were fully endorsed by the house. Dr. S.S. Baghel, VC, AAU, Jorhat made it clear that higher education is now treated as service and not as a public good in 10th plan. These services can be charged. He strongly felt the need of Internationalization of higher education in agriculture looking to the strength and well development infrastructure. He invited the attention of educational planners of the National Commission to attract more number of foreign students. He emphasized for imparting quality education. Almost same views were expressed by Dr. S.N. Puri, V.C., CAU, Manipur by citing an example of increasing number of foreign students at MPUAT, Rahuri by simply providing good accommodation, good medical facilities, advisory services and close supervision. The Chairman added that the area of strength in each field needs to be identified to attract the foreign students. He insisted to cut down holidays, increase timings for library and working hours to involve them more actively. From the presentations and discussions, the following points emerged as recommendation are as under:

1. Internationalization of higher education in agriculture is required keeping in view of strong strength we have excepting some weaknesses looking to WTO & GATS.
2. To encourage internationalization, important facilities like good foreign officers, foreign advisors, liberalization of admission procedure, visa procedure, good accommodation, medical facilities needs to be created.
3. Important area in each field looking to the strength needs to be identified focused and deserved proper attention in order to attract more students from abroad.

SUB-THEME IV

Vocational Courses in Upcoming and Export Oriented Fields in Agriculture

Chairman : Dr. S.N. Puri, VC, CAU, Manipur

Rapporteur : Dr.S.S. Rao, ADR, IGAU, Raipur

Dr. S.N. Puri, Chairman of the session welcomed the house and in his introductory remarks he explained the importance the vocational courses to generate self-employment. The chairman invited Dr. D.K. Bagchi to deliver lecture on "Agriculture technological backstopping through education and training for self-employment: Some basic dimensions". The speaker expressed a need to start job oriented courses in the areas of agriculture, horticulture, forestry, animal sciences, fisheries etc. He also suggested some important topics of vocational courses for rural youth to promote self-employment among the youth on these aspects. A few trainings on these aspects are being organized at present by MANAGE, SFAC and NABARD, but he felt that these are insufficient and also opined that there is a great need to organize many programmes to train agricultural graduates to take up self employment. In this process he suggested involvement/use of IT for faster dissemination. He suggested to encourage agricultural graduates to organize self-help groups. This lecture was followed by another lecture by Dr. K.C.P. Singh, Dean College of Dairy Technology, IGAU, Raipur. Dr. Singh elaborately explained about vocational education in dairying: opportunities and challenges. He opined that encouraging dairying would help for enhancing the employment opportunities in India many folds in comparison to agriculture or other allied groups. The speaker explained in detail about the activities going on these aspects. He also expressed the view that there is a vast scope for organic milk production in Chhattisgarh State, subject to market for organically produced products.

Chairman in his closing remarks stressed on the following points. Vocational courses in veterinary and animal sciences, Dairying and agricultural sciences have immense importance in upliftment of producers/farmers. He also emphasized on vocational education in processing of products may be very useful. He expressed that the role of middle man should be avoided, since at present middleman is more benefitted than producer. The session ended with thanks to the chair.

SUB-THEME VII

Agri-Clinics and Agri-Business

Chairman : Dr. H.C. Mishra, NDUAT, Faizabad

Rapporteur : Dr. G.K. Awadhiya, IGAU, Raipur

Dr. Reddy from ANGRAU, Hyderabad, presented his paper on the theme. He emphasized that agricultural extensions services need to strengthen because there is a wide gap in extension worker and farmers. Hence percolation of improved technologies at the root level is hampered. To overcome such obstacles agri-clinic centers need to be given to agricultural graduates.

In A.P. there are five training centers/organisations doing the same job *i.e.* EEI, PRDIS, NARDI, CAFWU etc. These agriclinic training centres provide expert service on location and need based. Many theories, practices, doubt-clearing sessions are being organized. In spite of these efforts success rate is very low due to non co-operative attitude of bankers, lack of motivation and delayed training funds. Speaker suggested the following to overcoming such problems:

- i. Bankers should fix their priorities for easy loan.
- ii. Concealing of the incumbent and bankers reinforce the interest of aspirant etc.

An elaborate discussion was held on the topic considering various issues and the following recommendations emerged out.

- a) The financing process needs to be improved so that trainees can get loan easily.
- b) Failure of agri-business would be due to lacking of confidence among the trainees. The lack of confidence would happen due to the involvement of same teachers in the training programmes who taught the student during his study for at least four years.
- c) Selection of candidates should be very strict based on keen interest and need.
- d) The syllabi of the degree courses must be practical rather than theoretical.
- e) The mindset of students as well as their parents must be made in such a way that there are shrinking of public sectors jobs and hence they must be ready to accept agri-business. This needs orientation from very beginning.
- f) RAWE course needs to modify. Less risk bearing business like dairy and poultry etc. be initiated by the trainees. ICAR feels to extend RAWE period up to one year.

SUB-THEME - VIII

Private Extension Systems

Chairman : Dr. C.R. Hazra, Vice-Chancellor, IGAU, Raipur

Rapporteur : Dr. S.B. Verulkar, Senior Scientist, IGAU, Raipur

The session started with introductory remark by the Chairman Dr. C.R. Hazra. He emphasized on some points like agriculture system during 60's and 70's, when research and extension were given equal importance and both worked together. However since last one and half decade extension system is jeopardized, government support has gone down, number of posts area lying vacant, number of extension personnel has gown down. With limited staff at KVKs all the farmer needs cannot be solved and problems cannot be addressed. Therefore a need is now felt at state as well as national levels that private sectors can be involved in extension services, which can act as complimentary to public sector. He pointed out that is happening in many countries. He also emphasized that there should be proper linkage between public and private sectors.

The keynote speech was delivered by Dr. S.S. Baghel, Vice-Chancellor, AAU, Jorhat on "Private Extension in India".

He stated that agriculture is being significantly changing from conventional to commercial. He pointed out that production and productivity have been static now, population is increasing, land, water and resources availabilities are reducing, the rate of increase in agriculture's contribution in GDP is 1.5%. Therefore the research and extension should be viewed in different perspectives. He also highlighted the deficiencies of public sector extension services, which included lack of sustained funding, poor governess, no accountability, poor coverage, lack of qualified specialists. He also discussed the national policy on Agriculture extension. He also pointed out the private extension has already taken shape and highlighted the areas where it is and can be useful. He also highlighted how extension activities are taken up successfully by some private enterprise. Some success stories of different countries were also presented. In a nutshell he told that there is a good scope for increasing efficiency with less budget requirement for a balanced sharing by private and public sectors for the task of extension.

Prof. N. Balaraman, VC, TNUVAS, Chennai made the presentation on "Vocational courses in veterinary and animal sciences". He clearly emphasized the need for vocational courses in different fields. He listed various fields with due explanations for various courses

in upcoming fields, export field, farming system, hatchery and brooder management, production and farm management, quality assurance, fodder production, veterinary medicine, fishery production, livestock business management and some upstream areas.

Dr. K.C.P. Rao from ANGRAU, Hyderabad delivered his lecture on privatization of extension. He pointed out with the limitations of present services and emphasized that numbers of personnel are not enough to meet the demand. He said that at international levels number of factors of successful examples of private extension services are there but these factors need to be assessed while its implementation under Indian context. He also presented experiences in India also particularly at Punjab, Kerala, Karnataka and Pondicherry. He emphasized the need to start the privatization on pilot basis, need to reorient the extension system for better public-private entrepreneurship.

Dr. R.B. Shrama, DES, IGAU, Raipur his lecture narrated the current scenario. He quoted numerous examples of indigenous agricultural technologies which apparently look good, but need to be evaluated scientifically and after refinement it can be given back to small and marginal farmers to enhance the agricultural productivity.

There was a long discussion on these topics and some important points that emerged from the discussion are:

1. Government should develop legislation so that the over all system should work for the benefit of farming society.
2. It will be desirable that both the sectors should work as complementary to each other.
3. Village level government workers are given all sorts of job therefore the extension activities are affected. Hence, private sector extension activities are becoming successful.

Recommendations



Recommendations

Sub Theme I : Agricultural education policy in the country

1. HRD programmes should be liberal and timely implemented
2. One percent of Agricultural GDP should be allocated to NARS with rational distribution to education, research and extension education

Sub Theme II : Remolding of courses for self-employment generation

1. There is need to examine the existent course which have many good aspects and change the curricula if needed
2. It is necessary to strengthen the areas like taxonomy, disaster management, IPR etc.
3. There is a great need to revamp the Home Science course curricula

Sub Theme III : Internationalization of higher education in agriculture in the context of GATT

1. The SAUs have a great strength to internationalize higher education and for this necessary specialization, infrastructure etc. need to be developed.
2. SAUs may identify the niche areas and develop the needed course curricula in the niche areas across the disciplines for attracting international students
3. ICAR may provide proper guidelines for the course equivalence of graduate students from foreign countries

Sub Theme IV : Vocational courses in upcoming and export oriented fields

1. It is necessary to develop course curricula and necessary infrastructure for offering vocational courses in Agriculture, Veterinary sciences, Animal husbandry, Dairy Sciences and Fisheries
2. Trained technicians are needed and vocational courses in dairy sectors are to be developed and popularized among the youth especially rural youth

SubTheme V: Standardization and uniformity in course curricula in agriculture and allied sciences

1. Some scope may be given for consideration of the need based courses also in addition to the common one taught in the light of uniformity
2. Uniform admission procedure should be adopted in all SAUs

Sub Theme VI: Industry- SAUs linkage for agro-processing marketing and employment

1. There may be agricultural engineering extension specialization in SAUs
2. Close collaboration with industrial extension centers and R&D institutes

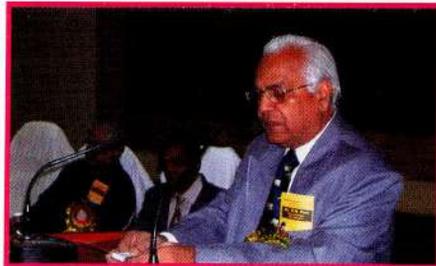
Sub Theme VII: Agri-clinics and Agro-business

1. Extension workers to farmers ratio is very wide. There is a need to reduce the gap in order to make the extension effective. Agri-clinics and Agro-business centers can fill the gap and support the extension services.
2. Confidence building among the students is the need of the hour. There must be some curricula to build up confidence among the students to develop self-employment. For such activities the infrastructure developments funds support should come from ICAR.

Sub Theme VIII: Private extension system

- 1) Privatization of extension services is inevitable in the present context of agriculture. Even other countries in the world are doing privatization. It is necessary to have public-private sector linkage and coordination for agricultural extension.
- 2) E-extension has a great potential in India. Development of rural infrastructure is necessary for utilization of the e-extension potential in India.
- 3) Contract farming can, in one way, help the small and medium farmers to get assured technological support for crop production as well as assured marketing of their products. However proper legislative protecting measures are needed to avoid exploitation of the farmers.
- 4) In rainfed areas, blending of traditional and modern technologies is very much needed for better adoption of technology.

Some papers submitted to the National Symposium



Agricultural Education: Emerging Challenges and Possible Solutions

Sudhakar Jogi

Dean, Faculty of Veterinary Science & Animal Husbandry, IGAU, Raipur (C.G.)

Agricultural education is different from that of general education. The former has to meet the challenges of agriculture and add value to the agricultural economy. As Radhakrishnan Commission discussing education points out, 'Universities which promote general education are houses of intellectual adventure. This implies that the products that come out from these Universities would seek and cultivate new knowledge, engage vigorously and fearlessly in the pursuit of truth and interpret old knowledge and beliefs in the light of new needs and discoveries'. Not that these are not necessary in agricultural education. In addition to these, agricultural education will have to have some specific objectives to improve productivity of land and labour who are engaged in agriculture, train the farmers to improve their capability to acquire new knowledge and adapt them effectively. Further, it should help in promoting economic development, opening new opportunities for employment, facilitating new change and democratic growth which the nation has decided as its basic goal.

Some of the problems besetting the agricultural education are as under :

- Two-thirds of population depending on agriculture, it has not received priority it deserves;
- Relatively young in the process of learning ways to integrate teaching, research and extension;
- The agricultural education is least preferred, particularly in current circumstances when the gap between available jobs and the number of agricultural graduates being produced tend to widen every day;
- Preference for supporting urban based agriculture rather than working in the rural areas through poly house technology, mushroom cultivation, etc;
- The course curricula tend to be uniform without inadequate focus on regional specificities;
- Too much compartmentalization in basic and applied education and research;
- The course curricula continue to be designed mainly for irrigated areas and most favoured crops. Less scope for incorporating regional specificities and stress situations;
- Inadequate emphasis on livestock, forestry, rangeland management, high value crops including medicinal aromatic plants. These are important activities in the mountains.
- Lack of expertise in agriculture at the policy planning level;
- Low priority to agricultural education in terms of resource allocation.

- Inadequate linkages with state agricultural department and rural development agencies which have the responsibility of delivering agricultural inputs and services;
- Many of the agricultural education institutions have no outreach programme-the scientists-farmers' interaction is very low.

Further the agricultural education system in agricultural universities located in hills and mountains needs to be changed to meet the requirements of the farming communities living in remote and inaccessible areas having diverse agro-ecological niches. The present educational system is insensitive and unsuitable to the ecological and socio-economic conditions in mountainous regions in as much as the existing system lays more emphasis on monoculture and on individual crops whereas agriculture in the mountains is largely based on integrated agricultural-horticultural crops-livestock-agro forestry farming systems. It also does not give adequate emphasis to the sustainable use of natural resources. Some of the suggestions to overcome the problems are given below:

- Overcoming past neglect of mountain agricultural education and research system;
- Redesigning agricultural education and research priorities to promote sustainable agriculture.
- Close cooperation between regional, national and international agricultural research centres.
- Integrating education research and extension programme.
- Emphasis on entrepreneurship development and market intelligence and management especially in today's economic context.
- Introduction of courses that have high employment potential and are demand driven like agri-business management, bio-technology, post-harvest technology and marketing, etc.
- Allowing public-private sector partnership in agricultural education and research to generate resources.
- Promoting better linkages with the industries to make the education more relevant to needs of the industrial sector.
- Instituting a suitable system of rewards and punishments for encouraging excellence.
- Incorporating management concerns and entrepreneurial education into the course curricula.
- Emphasis on consolidation rather than proliferation of agricultural education institutions.
- And more importantly, enhanced liberal financial support from the government.

Some of the measures for improvement of the Quality of Agricultural Education are:

- Pedagogical training of teachers.
- Discouraging inbreeding.
- Active involvement of faculty members in the development/changing education system.
- Effective tutorials and advisory system.
- Judicious mix of external and internal system of evaluation.
- Proper balance between basic and applied knowledge.
- Instituting short term training courses on different enterprises like bee-keeping, dairy, mushroom, sericulture, rabbitary, seed production, post harvest technology including value addition, and so on.
- Encouraging the agricultural graduates to enter into the business of seed production, seed and agro-chemical supplies and providing extension services, know-how about post harvest technology, fruit nurseries, floriculture, and vegetable growing and small scale agro-processing activities.
- Taking up marketing and export of agricultural produce especially in the areas growing high value cash crops.

Karl Marx long ago said that theory without practice is lame, and practice without theory, blind. At present, Agriculture-as taught is lame, and Agriculture-as practiced, blind. In the future, our knowledge systems should be so managed that our Universities bridge this gap, and wed theory to practice in the vast variety of occupations, challenges and opportunities that Agriculture still holds out for our Nation.

Remolding Agriculture Course Curricula for Self-employment Generation

M. Sudarshan Reddy¹ and B.Vijayabhinandana²

¹Dean of Agriculture, ANGR Agricultural University, Hyderabad

²Assistant Professor, ANGR Agricultural University, Hyderabad

Economic and political strategies predict that India is likely to emerge as a strong regional power in the early years of the new millennium. To attain that coveted status there is a long and difficult road ahead. India would continue to derive its economic strength from agriculture though the share of agriculture to Gross Domestic Product has been declining over the time. One of the important achievements of post-independent India is that the scarcity of food grain has become a thing of the past and Indian agriculture is no longer vulnerable to weather fluctuations. Today our godowns have a stock of more than 60 million tons. Notwithstanding these achievements, the basic problems of poverty, food security, nutritional security (malnutrition), employment security, equity and sustainability continue to be a cause of concern. In the world markets, following the signing of WTO is another issue, which requires constant attention of teaching community.

Agricultural education has a critical role to play in our efforts towards sustainable food, nutritional and environmental security and to prepare Indian agriculture to take advantage of liberalized environment to reach a pre-eminent position in the global agricultural trade.

Over the past 50 years the country has acquired a unique capability to provide agricultural education. India has one of the largest and institutional complex agricultural education systems in the world. Simultaneously, India enjoys an envious position in the world because of a large and competent human resource that supports education. However, we cannot certainly afford to be complacent as the challenges facing agriculture in the 21st century are much more intransigent than those faced before. Strategies for agricultural education have to be reoriented keeping the following points in view. Firstly, there has been over exploitation and loss of quality of natural resources such as land and water, depletion of genetic diversity and land cover. Secondly, opening of our doors to global markets may pose considerable challenges as well as opportunities both at home and abroad. Thirdly, population is still growing at an alarming rate, and feeding of an additional population of nearly 17 million each year is going to be one of the greatest challenges. By 2020 we may have to produce 100 million tons additional food grains to meet our needs. Another concern alarming at present is the employment pattern, which fresh graduates and postgraduates are facing. Chances for increasing employment pattern appear less bright due to decline in public sector jobs and non increasing demand for agricultural graduates in the private sector.

Curriculum may be regarded as a scheme, plan, project, process, tool, method and strategy to modernize education by providing qualitative dimension. It could also be regarded as a programme of studies or activities or guidance, whose primary objective is to enable the student to come to grips with the environment to which the functionaries through a sequence of potential experiences relate thought to disciplined action. Curriculum development is nothing less and nothing more than a well planned programme of guiding-learning experiences to bring desired attitudinal/behavioural changes among students keeping in view the objectives of the particular institution or the larger interests of the society or nation / world. In this sense, an ideal university curriculum is the product of a well-conceived, carefully considered, deliberate, scientifically planned endeavour to transform students through appropriate behavioural modification. Such an understanding of curricula is inclusive of academic subjects, as also the totality of experience of students in Universities. Curriculum development is a continuous process and the curriculum need to refined and revised based on the developments that are taking place as described above.

Traditional orientation of agricultural education in India: The agricultural education in India has an orientation towards traditional and improved way of crop production with very little attention paid to value addition in terms of storage, cold storage, transportation and processing. Similarly, market research into demand projections, exploring markets and export potential and important considerations, which are currently weak for choice of production technologies as well as establishing backward and forward linkages to make them commercially viable from the farmers as well as the industries point of view. It will call for making agricultural education more focused and dynamic in order to serve the cause of all stakeholders. We need to evolve agricultural education system that is harmonized with job markets and also meets the changing need of agricultural sector. In this direction, the SAUs have to come with education plans with an eye on courses and programmes and propel Indian agriculture in the coming years with a gusto of competitiveness.

Agricultural education will have to lay more emphasis in building technical skills, professional competency, self-confidence, managerial abilities, and entrepreneurship to meet the new challenges. Courses which are of current and future relevance should find place in the curriculum at both undergraduate and postgraduate programmes with a view to expose students to upcoming and frontier areas of science. For instance, biotechnology, bio-informatics, precision agriculture, IPM, Environmental Sciences, application of remote sensing in agriculture, biodiversity, agro meteorology, molecular biology, agribusiness management, international trade, IPRs and computer applications are subject areas that will call for greater emphasis in future. In order to create and enabling environment for imparting education in these subject areas, it will be necessary to build the capacity of our faculty and provide them with first rate facilities.

Agricultural Human Resource Development in ANGRAU: The Agricultural Human Resource Development Project (AHRDP) was implemented with the assistance of the World Bank for a period of five years. The project's main focus was to improve the quality and relevance of Agricultural Education. It was implemented during 1995 to 2000. During this period, model classroom equipped with modern A.V. aids were set up, labs were equipped with necessary apparatus, and teachers were trained in advanced areas within the country as well as in abroad. Besides, libraries in the University were also strengthened with more books, journals and references. During this period, all the colleges of the University got accredited. To make agricultural education more relevant to the needs of user agencies, Broad Based Advisory Group (BBAC) was constituted with 37 members comprising progressive farmers, representatives of NGOs, banking sector, fertilizer, pesticide, seed agribusiness, poultry industries etc. and officials of the university. One educational technology and development cell was also established to suggest the courses useful for the students and also to improve the quality of education in the university. To expose the undergraduate students in real world situation and to gain self. confidence for self-employment, the curriculum has been redesigned with a bunch of courses involving hands on training as an initial step in the University.

- Commercial Agriculture and Business Management
- Agribusiness management
- Seed technology
- Environment sciences
- Food technology

Further Thrust: It is not enough and curriculum revision is a continuous activity and in the present circumstances the graduates who are coming out of the University should not be job seekers and they have to be the job providers without looking at the Government. So many states are facing financial crunch and willing to down size their government and wanted to propagate the knowledge through tremendously developed communication technology and distance education through print and electronic media. Hence, there is need to relook at the present curriculum and need to be revised so that outgoing students can start their ventures on their own and give employment to others. In this connection, Government of India is also encouraging and supporting the graduates who venture by extending financial support without collateral security. After having thorough discussions/with the faculty, students and other stake holders, the following courses need to be included in the curriculum that will enable them to earn livelihood on their own.

- Nursery Technology
- Commercial production of spawn and mushroom
- Production of bio-control agents

- Bio-fertilizer production
- Broiler production
- Seed Production
- Hybrid technology - for still higher yields
- New food product development
- Sericulture
- Apiculture
- Production of paper boards from agricultural waste materials
- Orchard management
- Medicinal and aromatic plants
- Integrated Pest Management
- Farm implements and machinery
- Floriculture
- Landscaping
- Olericulture
- Post harvest preservation
- Post harvest processing
- Biotechnology and Genetic Engineering
- Integrated water and nutrient management
- Marketing management
- Communication and advertisement
- Market led extension management
- Warehousing and cool chain management
- Business management and records keeping
- International trade and export
- Group formation
- Information Communication Technology

Agriculture education should aim at equipping farm graduates to undertake the task of precision agriculture, intensification, diversification and value addition in an integrated manner. The graduates should become job creators and not always remain search for white collared jobs. Therefore, it becomes all the more imperative that students get proper practical training and adequate exposure to the art and science of business management to start enterprises at their own to provide services in areas like soil testing laboratory, crop production and crop protection, ware housing, agro-service centres, farm equipment centers, live-stock rearing and dairying, agro-processing centres etc. Besides, they should be well trained to become private extension agents.

Reference:

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Reorientation of B.Sc.(Agri.) Course Curricula at Faculty of Agriculture, Assam Agricultural University

R.C. Borah¹ & B.C. Borah²

¹*Dean, Faculty of Agriculture, AAU, Jorhat*

²*In-charge, Education Technology Cell, FA, AAU, Jorhat*

Introduction :

A curriculum refers to all learning experiences as input, organized in both formal and informal ways in order to help a group of learners to achieve certain given level of performances in given or expected operational situation through a given educational programme (Raman, 1982). Thus, the curriculum is a written document meant to specify the orientation of the courses both at macro and micro levels towards achieving the goals of the programme.

The course curricula in the State Agricultural Universities (SAUs) will call for revision to enhance relevance and practical utility in terms of skill and entrepreneurship development. There is a wide-spread consensus that the quality of agri-graduates in various disciplines of agricultural sciences is to be oriented in this direction. Therefore, it is an urgent need in the part of the SAUs to accord priority towards changing the Agricultural Education System/Pattern into more vocationalized with skills and expertise in certain specialized area.

It is a matter of fact that there is a little emphasis in the present curricula, for preparing our under graduates in such a direction. Rather, the system turnout graduates who are not well equipped to take agriculture as a vocational venture and depend mainly on Govt. and public sectors' jobs. In order to lessen this burden and also use agricultural human resources as job promoters rather than job seekers, it is important to introduce vocational courses cum training programme in new areas to inculcate entrepreneurship and professionalism.

Hence, to meet the above objectives/changing needs it is important that after foundation courses, excellence in specialized courses/areas are imperative. Definitely, this would call for a strategic long term perspective plan for producing graduates based on requirements in the changing scenario of job markets.

In view of the above fact, the Faculty of Agriculture, AAU, Jorhat has taken the initiative to updating the curriculum at under graduate level. The Faculty opted the 3+1 option i.e. three years of general/foundation courses of basic agriculture including RAWEP as proposed by the 4th Dean's Committee, ICAR. In the light of the fast changing scenario and advancement in Agricultural Sciences, for the last year of the B.Sc.(Agri.) programme, 13 different core/specialized areas of need based skill and entrepreneurial oriented areas have been selected. The quantum of various courses and credit hours (which are interdisciplinary in nature) have been worked out for each core/specialized areas alongwith their objectives.

Core/Specialized Area proposed :

1. Plant Protection and Agri-clinic :

The specialized area on plant protection and Agriclinic is proposed from the plant protection discipline comprising of Entomology, Plant Pathology, Nematology and Weed Science. All total 13 courses have been proposed with 39 credit hours. Out of 13 courses, 6 courses with 18 credit hours are of multi-disciplinary in nature consisting of all the four departments of plant protection (i.e. Plant Pathology, Entomology, Nematology and Agronomy (Weed Science) while, remaining 21 credits have been distributed as 6 credit hours each to both Entomology and Pathology, 5 and 4 credits hours each to Nematology and Weed Science respectively.

Objective :

- To impart comprehensive knowledge on insect, pathogens and weeds their management with integrated approach. Knowledge on agrochemicals their formulation, methods of application, residue analysis and handling of pesticide application equipments. Also knowledge on Biological Control, its mass multiplication, application and formulation for marketing.
- To impart comprehensive knowledge on Apiculture, Mushroom, Public health and environmental entomology and to develop skills and aptitude for operating a plant protection clinic.

2. Agricultural Extension Management :

This area of specialization is proposed from the discipline of Extension Education. All total 15 different courses with 40 credit hours have been proposed. Out of 15 courses one course with 3 credit hours is allotted to Agricultural Economics and Farm Management, while 2 courses with 5 credit hours are allotted to Agricultural Statistics.

Objective :

To impart comprehensive knowledge on Entrepreneurship Development, Concept of Training and HRD, Education Technology, Communication skill its importance and media available, concept of developmental planning and national planting system etc. The course will also impart knowledge on rural developmental programme alongwith participatory programme, role of youth and women in it. Also impart training on Journalism, viz. news writing, article writing, editing, proof reading, designing and lay out besides presentation.

3. Horticultural Crop Production and Management :

This area of specialization is proposed to be consisted with four components viz., Commercial fruit production, Commercial vegetable production, Commercial horticulture and Fruit and vegetable preservation. All total 12 courses have been proposed with 40 credit hours.

Objective :

To develop practical knowledge and skills for commercial cultivation of fruits, vegetables, flowers, ornamental plants, spices etc in the context of changing scenario of Indian Horticulture and to develop confidence for venturing into commercial venture for self employment and enterprenurship development. Also to acquaint students to commercial seed production, its storage and commercial nursery development of vegetables, flowers, ornamental plants etc. and its marketing. The course will also impart knowledge on fundamentals in vegetables and fruit processing including its preservation and marketing.

4. Plantation Crop:

The area of specialization on plantation crop has been proposed from the discipline of Tea Husbandry and Technology. The other associated departments are Agricultural Biochemistry, Agricultural Economics and Farm Management, Agricultural Enginerring, Pathology, Entomology and Extension Education. Under this area there are two packages proposed namely

Package I : Human Resource Development

Package II : Entrepreneurship Development for Self Employment

The Package I consists of 8 courses with 19 credit hours while package-II consists of 8 courses with 21 credit hours. Apart from this a mendatory/compulsory set of courses have been proposed consisting of 7 numbers of courses with 18 credit hours. Compulsory courses shall have to be offered in 6th semester and either of the package shall have to be offered in 7th semester of B.Sc.(Agri.) degree programme (as per new curriculum).

Objective :

To impart knowledge on Commercial tea cultivation, Tea manufacturing, Skills in handling the process of tea manufacture, Garden management including Human resource management, Accounting procedure and Marketing system of tea. The course will provide comprehensive knowledge on commercial nursery development, organic tea and its cultivation including pest and disease and drainage planning and irrigation. Also it impart knowledge on legal provision to the tea industry, various laws necessary for tea garden management, tea trade prevailing in the country and financial management, including quality control and tea testing etc.

5. Natural Resource Management :

This area of specialization will offer by the department of Soil Science as nodal department and Agronomy, Agro-meteorology, Agricultural Engineering, Plant Pathology, Entomology and Horticulture will involve as associated departments. The area will consists of four thematic areas (modules)

1. Soil Water Resource Management : This module consists of 5 courses with 15 credit hrs.
2. Organic Farming : This module proposed four courses with 11 credit hrs.
3. Biodiversity Conservation and Management : This module consists of 3 courses with 7 credit hrs.
4. Environmental Analysis : This module consists of one course with 3 credit hrs.

Objective :

To provide basic knowledge on appropriate natural resource management. Knowledge on development of skill for entrepreneurship on analysis of soil, fertilizer and water quality, on isolation and mass multiplication of beneficial soil micro-organisms and on organic farming concept by efficient utilization of organic waste materials. The course further, provide knowledge on isolation, mass culturing and application of antagonists against pests and diseases. It also impart knowledge on role of element of weather on crop growth and incidence of pests and diseases in relation to weather variability.

6. Entrepreneurship in Agricultural Biotechnology :

This area of specialization will be led by Agricultural Biotechnology as nodal department. While Agricultural Biochemistry, Plant Breeding and Genetics, Horticulture, Plant Pathology, Entomology will involve as associated departments. The area proposed 12 courses with 34 credit hours.

Objective :

Impart knowledge on plant genetic system, importance of mycrols in agriculture, importance of enzyme in industry and industrial enzyme purification, knowledge on plant tissue culture, cellular totipotency, micro-propagation, artificial seed, cryopreservation etc. It impart knowledge on industrial microbiology such as production of beer, wine, enzymes,

fermented food and knowledge on IPR general agreement as trade and tariff WTO etc. and also impart knowledge on Applied Immunology.

7. Field Crop Production and Management :

For this area of specialization, the Discipline of Agronomy will act as a nodal discipline while Soil Science, Agricultural Engineering, Crop Physiology, Agricultural Meteorology will act as associated departments.

All total 14 courses with 36 credit hours have been proposed under this area of specialization out of which 2 courses with 4 credit hours have been allotted to Agricultural Engineering one each to Agro-meteorology, Crop Physiology and Soil Science with 3,3 and 2 credit hours respectively.

Objective :

To acquire knowledge on raising of field crops, irrigation and water harvesting techniques and moisture conservation practices, soil fertility management, use of modern machineries etc. It also impart knowledge on weather parameters, their influence on crop growth, influence of various agro-econological factors for environmental pollution and impart knowledge on impact of INM for sustaining soil fertility and crop productivity.

8. Production and Management of Commercial/Industrial Crops :

The area will be led by the department of Agronomy as nodal department and Agricultural Engineering, Horticulture, Agricultural Biochemistry and Tea Husbandry and Technology will involved as associated departments. All total 14 courses have been proposed with 36 credit hours.

Objective :

To acquire knowledge on production technology of important fibre crops, sugar and narcotics, oil seed, aromatic and medicinal crops, scented and glutinous rice etc. including post harvest technology and market feasibility.

9. Integrated Farming System:

This specialized area will be led by the department of Agronomy as nodal department and Animal Husbandry & Dairy, Horticulture, Sericulture, Fishery, Entomology, Pathology, Nematology, Agricultural Engineering and Agricultural Economics and Farm Management as associate departments.

Objective :

To acquaint with crop component in Integrated Farming System (IFS). To impart knowledge on prevailing agro-forestry system and scope of improvement and importance of organic farming in farming system. Also to impart knowledge on Fishery, Poultry, Piggery, Sericulture, Dairy Industry, Apiculture, Mushroom their modern methods of management

including knowledge on commercial farming for entrepreneurship development. The basic economic principles having relevance in farming system analysis also be included.

10. Agri-Business Management:

The area of Agri-Business Management proposes 11 different courses with 28 credit hours. The nodal department will be the Agricultural Economics and Farm Management while associated department will be Extension Education and Agricultural Statistics.

Objective :

To impart knowledge on production management and application of farm business, decision making abilities in marketing and sales, develop skills on financial decision making ability and business accounting, sales management and advertising for effective marketing. Also impart knowledge on human resource management and develop skills for developing entrepreneurship ability and entrepreneurial management.

11. Marketing and Financial Management:

This area of specialization will be dealt by the Discipline of Agricultural Economics and Farm Management as nodal discipline which Agricultural Statistics and Extension Education will be the associated discipline. The area has 10 different courses with 28 credit hours.

Objective :

To impart knowledge on basic concept of marketing including price analysis, on banking and financial institution their role and method of functioning. Also impart knowledge on decision making ability in marketing and sales management.

12. Rural Institutions:

This area of specialization will be offered by the department of Agricultural Economics and Farm Management as nodal department and Agricultural Statistics and Extension Education as associated departments. The course is consisting of 10 different courses with 29 credit hours.

Objective :

To familiarized with various rural institution and impart knowledge on working with various rural institutions. To make aware of the malfunctioning of rural areas and knowledge on approaches to rural development. To develop skills for effective communication for development.

13. Crop Improvement :

Crop improvement will be dealt by the department of Plant Breeding and Genetics as nodal department while biochemistry, Horticulture, and Crop Physiology will be the associated departments. All total 15 courses has been suggested with 40 credit hours.

Objective :

To impart comprehensive knowledge on Biometrical approaches in Plant Breeding, Cytogenetics and Genetics. Also impart knowledge on Breeding for Environmental Stress, Hybrid Breeding and Biochemistry of quality attributes in addition to knowledge on Hybrid Commercial, Seed Production, Tissue Culture, Conservation of Plant Genetic Resources, Breeding of field and Horticultural Crops etc.

Table 1: List of Core/Specialized Areas and tentative allotment of numbers of courses and credit hours under each areas

Sl. No.	Core/Specialized Area	Nodal Department	Associated Discipline	No. of courses proposed	Total credit hrs.
1.	Natural Resource Management	Soil Science	Agronomy, Entomology (Biopesticide)	11	31
2.	Agril. Extension Management	Extension Education	Agricultural Economics and Farm Management, Agricultural Statistics	15	40
3.	Field Crop Production and Management	Agronomy	Soil Science, Agricultural Engineering, Crop Physiology, Agrometeorology	14	36
4.	Production and Management of Commercial/Industrial Crops	Agronomy	Horticulture, Tea Husbandry and technology, Biochemistry, Agricultural Engineering	14	36
5.	Integrated Farming System	Agronomy	Horticulture, Sericulture, Fishery, APM, Ento. (Apiculture), Patho. (Apiculture)	15	36
6.	Entrepreneurship in Agril. Biotechnology	Agricultural Biotechnology	Plant Breeding & Genetics, Biochemistry, Plant Pathology and Crop Physiology	12	34
7.	Horticultural Crop Production and Management	Horticulture	Crop Physiology, Agril. Engineering, Biotechnology, Entomology, pathology, Biochemistry, Soil Science and Plant Breeding and Genetics	17	40
8.	Crop Improvement	Plant Breeding and Genetics	Agril. Biotechnology, Agronomy, Biochemistry, horticulture, Entomology, Pathology	15	40
9.	Plant Protection and Agrilclinic	Entomology	Pathology, Nematology, Agronomy, Soil Science, Crop Physiology (Environmental Science)	13	39
10.	Plantation Crops	Tea Husbandry and Technology	Horticulture, Agril. Engineering, Agril. Economics, Entomology, Pathology, Biochemistry, Agril. Biotechnology	15	40
11.	Agri-Business Management	Agricultural Economics	Extension Education, Agril. Statistics	11	31
12.	Marketing and Financial Management	Agricultural Economics	Extension Education, Agricultural Statistics	10	28
13.	Rural Institutions	Agricultural Economics	Extension Education, Agricultural Statistics	10	23

The Faculty of Agriculture, AAU has further taken initiative to update the following tentative allotment of courses with credit hours for each discipline under general (common) courses for 5 semester for B.Sc.(Agri.) programme.

Table 2: Tentative allotment of credit hours under general (common) courses (for 5 semesters) for each discipline

Present credit loads		Proposed (tentative) credit loads
Agronomy	17	17
Agricultural Economics & Farm Management	10	9
Agricultural Engineering	6	5
Agricultural Biotechnology	2	2
Agricultural Extension	9	8
Agricultural Biotechnology	5	5
Crop Physiology	4	4
Entomology	9	9
Agricultural Statistics	5	5
Tea Husbandry	-	2
Agricultural Meteorology	5	3
Horticulture	16	14
Animal Husbandry	3	3
Nematology	4	4
Plant Breeding	11	8
Plant Pathology	10	8
Soil Science	11	8
Sericulture	-	-
NSS	2	2
Total	129	116

Conclusion :

Agricultural Education in India has an orientation towards crop production and management and very little attention is paid to create a cadre of professionals to provide technical and professional services such as diagnostic service for plants and soil health, farm management/business management, technical land entrepreneurial skills so as to develop confidence among the graduates to engaged themselves in self employment programme.

On the rapid changing scenario in the employment opportunities in the job market, the structure and content of Under Graduate teaching programme at SAUs must be under constant review with a view to increase quality of skills and practical utility. If the agricultural education imparted is not tuned to the current and future requirement then this will mismatch between human resource development and their utilization.

Reference :

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Remodelling of Course Curricula For Self-Empolymnt Generation

Vijaya Khader *

Dean, Faculty of Home Science, ANGARU, Hyderabad, A.P.

The home science education for several years viewed as a course which is confined to the house hold activities. Now with drastic changes and remodeling of the curricula of the home science it is paves a path for self employment. The trimester system was changed to semester pattern in 1972. New courses were introduced in 1974. In 1979 the emphasis was on making the course more skill oriented, with greater weight age on practical. New courses were introduced to equip the students with necessary skills to work in rural community in the area if child care, resource management, health and hygiene. In 1984 more elective courses were introduced in Agricultural and veterinary sciences, thus offering more flexible programme with the core courses being made compulsory. Inn order to promote self employment of the students certain production oriented courses like pay and play materials, dyeing and printing, canteen management, food preservation, planning of socio-economic projects for women have been introduced. To make the curriculum more comprehensive and interdisciplinary courses like sericulture, horticulture, poultry, piggery, Dairy, Bee keeping etc. have also been introduced.

In the year 1991 to give much more emphasis that the home science education is rural oriented the degree was renamed as B.H. Sc. (Rural) with 100 credit hours and rural Home Science work experience programme was introduced with 15 credits and 12 credits of production oriented courses drawn from Agriculture, veterinary and Home Science was offered with duration of 3 years.

Until 1999 the 3 year programme was offered however in the ever changing needs of the society it was felt that this has provided skill to the students in only a limited number of courses. Consequently the out going students could not be recognized as trained in any specific area to seek jobs. However, it could give exposure to the students to the rural communities in terms of the community needs, problems, and interventions required as a learning process while giving some education and new experience for the rural families.

In the course of time the need for giving more intensive skilled training in a specific area was felt necessary, consequently the III deans committee in its meeting held in the year 1973 proposed four year degree programme with specialization. Consequent to this committee report, home science faculty of some agricultural universities introduced 3+1 undergraduate programme where in three years of common courses and one year of

* Could not attended the Symposium

specialization. Even this programme was also felt insufficient to meet the required training in specific area. Subsequently the deans of home science faculties felt 2+2 UG programme where two years of common courses and two years of specialization was necessary. A course catalogue prepared at ICAR was communicated to all SAU's for implementation of the programme. Liberty was given to change the courses and course content according to the needs of the various regions.

Against this back ground the faculty of Home science in ANGRAU developed the course contents in the year 2000 after several discussions with the user agencies and line departments, Alumni and experts in the area of importance. The degree is being offered as B. HSc mentioning specialization also in the degree, the first two years consisting core courses and second two years specialization. Within the specialization the faculty has chosen to offer one set of professional electives to initiate and extending to other sets of professional electives to initiate and extending to other sets of professional electives in later years. The present specializations and their concerned professional electives are as follows

Specializations

Foods and nutrition
 Human Development and Family studies
 Resource management and consumer sciences
 Apparel and textiles
 Extension Education

Professional electives

Nutrition and dietetics
 Organizations and management of early child hood programme
 Interior design
 Apparel production management
 Journalism and mass communication

CREDIT HOURS

Core Courses	78
Professional elective courses	50/40*
Internship	10/20#
RHWEP	10
Supporting Course	10##
Total	158

*For nutrition and dietetics professional elective stream

two internships for nutrition and dietetics

to be selected from disciplines other than the specialization.

In the first two years irrespective of the specialization the student will be studying core courses of home science which will help them the home science in broader way. Branching of students to specialization courses starts in III year and the professional elective courses are offered with more practical hours which provide intensive training. The courses like computer sciences, Computer Aided Designing (CAD) were included to meet changing demands of the industry.

Internship :

The students are placed in industry/institute/hospital related to the specialization for 6 weeks which will help them gain hands on experience and entrepreneurship skills for self-employment.

Rural Home science work experience programme (RHWEP) :

The RHWEP provides the learning experience in the field. The students are placed in the field for 6 weeks to learn and demonstrate various issues related to their specialization.

The courses that are offered for the first year are English and Technical writing, Elementary statistics, Bio-chemistry-I, Prenatal Care and Infant Development, Human Nutrition-I, Principles of Family Resource Management, Fundamentals of Clothing Construction, Extension Education and Rural Development, Computer Science-I, Textile Science and Care, Early Childhood Development, Care and Education, Food Science, Communication And Instructional Technology and Housing and Space Management.

The courses in the second year are Apparel Designing and Construction, Fundamentals of Normal and Therapeutic Nutrition, Programme Development for Rural Families, Late Childhood and Adolescence, Computer Science-II, Household Equipment, Fundamentals of Interior design, Dynamics of Marriage and Family, Fundamentals of Textile Designing, Principles of Food Preservation, diffusion and Adoption of Homestead Technologies, Family Economics and Consumer Education and Entrepreneurship Development and Management.

The professional elective courses for the apparel and textiles; Fundamentals of Clothing Construction, Textile Science and Care, Apparel Designing and Construction, Fundamentals of Textile Designing, Traditional Indian Textiles, Principles of Design and Application, computer Aided Designing-I, Apparel Manufacture-I, Traditional Costumes of India, Case Study/Special Project, Fashion Illustrations, Retailing and Merchandising in Textiles and Apparel, Apparel Manufacture-II, Computer Aided Designing II, Designing through Dyeing and Printing, Fabric Embellishment-I, Computer Aided Designing-III, Apparel Industry Management, Draping Techniques, Fabric Embellishments-II, Design Studio Practices and Project work.

The professional elective course for foods and nutrition: 11, Biochemistry-I, Human Nutrition-I, Food Science, Fundamentals of Normal and Therapeutic Nutrition, Principles of Food Preservation, Human Physiology, Biochemistry-II, Human Nutrition-II, Community Nutrition, Bakery and Confectionary, Health and Hygiene, Food Chemistry, Institutional Food Service Management, Food Standards and Quality Control, Development of Dietetic Foods, Diet Therapy-I, Case Study/Special Project, Diet and Nutrition Counseling, Clinical Nutrition and Diet Therapy.

The professional elective courses for human development and family studies: Parental Care and Infant Development, Early Childhood Development, Care and Education, Late Childhood and Adolescence, Dynamics of Marriage and Family, Psychological Aspects of Early Childhood Development, Education Programmes, Literature for Young Children Development Assessment of Young Children, Material Development for Early Childhood Education, Programmes, Infants Stimulation Programme, Management of Children with Special Needs, Monitoring Early Childhood Education Programmes, Policies and Programmes for Young Children, Case Study/Special Project, Intervention Programmes for Early Childhood Years, Parent and Community Education Programmes for Young Children.

The professional elective course for Resource management and Consumer sciences: Principles of Family and Resource Management, Housing and Space management, Household Equipment, Fundamentals of Interior Design, Family Economics and Consumer Education, Entrepreneurship Development and Management, Design Drafting and Perspective Planning, Walls, Window Treatments and Fittings, Furniture and Furnishings, Fundamentals of Flower Arrangement, Case Study/Special Project, Lighting Environment in Architectural Designing, Residential Interior Space Design, Commercial Interior Space Design, Functional Interiors for Special Needs, Landscape Gardening, Flower Arrangement-Styles and Techniques, Computer Aided Interior Design, Computer Aided landscape Design and Professional Practice.

Since the year 2000 the programme is being implemented successfully. Two batches of the students have completed the degree programme. The student admissions are also gradually increasing and in the current year all the seats were filled up at one time and some are kept in waiting list.

Mean time the feedback obtained from the first batch of students who are settled in the industries as employees suggested few revisions in the syllabus. Hence it has become imperative to revise the syllabus. The syllabus was revised avoiding repetition in various courses, incorporating more practical content, skill orientation and new supporting courses wherever required. Further in a seminar on reorientation of Home Science Education organized by ICAR at PAU, Ludhiana it was suggested to reorient the syllabus to keep abreast of the changing needs of the society & industry whenever required. Keeping this in view the cours contents were modified again in the current year i.e., 2005 and the list of the courses along with the modification approved in the academic council.

Some of the modifications that are made in the year 2005 are; In Traditional Indian Textiles Minor changes in practical course content was made, In Community Nutrition credit hours are increased in theory 4(2+2) by incorporating some of the topics of health and hygiene course. In Psychological aspects of Early Childhood Education Programmes practical credit hours are increase and in Management of early childhood Education Programmes the practical content was reduced. The title of Literature for young children was changed to Effective teaching methods for young children. Material development for early childhood education programmes was changed to Learning Disabilities Self-employment.

The training obtained through professional elective courses will enable them to establish diet counseling clinics, apparel production centers, boutiques, child counseling centers, interior designing consultancies etc to name a few, in addition to the job opportunities as dieticians in hospitals, fashion technologies, interior designers, apparel production managers. It is obvious that the present UG programme with specialization prepares the student as a job provider than a job seeker.

Vocational Courses in Veterinary and Animal Sciences

N. Balaraman

Vice Chancellor, Tamil Nadu Veterinary and Animal Sciences University, Chennai

Introduction :

Higher education in our country has undergone a sea change during the past decade due to advancement of science and technology and electronic, information technology aids. Needs of the end users of knowledge and skills have also changed calling for paradigm changes in our approach to higher education, which is poised to meet the requirements for improvement in production and productivity, quality service rendering, value addition of commodities and market demands. Organized production systems are in the offing in a large way and business management is going to play a major role in establishing forward and backward linkages between the producer and consumer. Employment is also going to be based on entrepreneurship, usefulness to institutions and service to society. In this context, the vocational courses are getting pointed attention in the present day. Vocational courses are by and large professional programmes of varying durations. They are occupational and employment oriented which emphasize the course contents to be largely skill and practical based. The candidate opting for a vocational course is readied for specific services to be rendered to the end users and stakeholders and the knowledge and skills are directly applicable in the field. Unlike the structured degree and diploma programmes, the vocational courses are of short duration. Since the courses are need based, they can be offered as commercial programmes with value tags in terms of fees and payment.

Upcoming areas :

There are several emerging, upcoming fields in different aspects of production, processing and management, which offer tremendous scope for vocational training and useful occupation. Germplasm improvement, conservation, multiplication and propagation are areas where new scientific and technological innovations have been introduced. Feeding management of high producing animals needs introduction of feed processing technologies and improvement in nutrient utilization. Livestock production scenario is changing from a subsidiary, subsistence and low key operation to organized, intensive, commercialized enterprise which is market driven and oriented towards automation, mechanization and computerization. Farms and plants need to be established with environmental concerns in mind. There is growing consciousness regarding waste disposal. Nutraceuticals and pharmaceuticals are playing key roles in animal health

management. Probiotics and bio preservatives are employed with advantage. New dimensions in value addition of livestock products such as milk, meat, eggs and fish have brightened the prospects of vocational training for self-employment. There is increase need for manufacture of machinery, equipment and appliances to cope up with the expanding requirements of the growing animal industry. With introduction of highly sensitive electrical and electronic equipment for laboratory analysis for diagnostics and quality control, instrumentation has become an invariable training requirement. Training is also needed in the fields of detection of adulterants, pollutants, contaminants and toxicants. Livestock business management is an emerging professional discipline. With emerging diseases in livestock, poultry, wild life, pets and fishes, diagnostic and clinical laboratory support is becoming more and more important and inevitable. In the management of wild life, specialized occupational training in elephants, wild ruminants and jungle feline and canine is increasingly demanded.

Export oriented fields :

India has the potential for supply and sale of valuable germplasm of different kinds of livestock in view of its biodiversity and rich resources of fauna. The demands for the zebu cattle and murrh buffaloes abroad are considerable. Indigenous livestock products are also becoming highly popular. This country can easily have an edge over others because of our traditional know how regarding their manufacture. Feed ingredients, total mixed rations and complete feeds based on the crop residues and other feeds of conventional and non-conventional origin can be manufactured for domestic and global market. Diagnostic kits for different scheduled diseases and vaccines for conventional and emerging diseases and other biological products can have excellent export potential provided we are able to motivate private investment on scale up and large scale production. Production of pharmaceuticals based on Indian herbs, nutraceuticals and probiotics also can be taken up. The byproducts of livestock industry especially from the dairy, poultry, meat and fish industry can be channelised for appropriate processing and marketing. Engineering aspects for developing housing systems, housing cages, refrigeration machinery are becoming important under growing intensification of livestock production. There is also need for developing equipment, kits and mechanisms for quality control of livestock products and human resource development.

Course offering units :

Vocational trainings are need based and can be organized at various levels. Specialized trainings are offered at the levels of University Directorates in the centralized laboratories and farms. Various subject matter divisions and departments can organize specific programmes relating to their disciplines; co-opting allied disciplines as and when necessary. University field research stations, instructional farms, Krishi vigyanludyog

kendras and farmers' training centers are among different training units, which can be effectively utilized for imparting vocational courses. Distance, correspondence, continuing educational programmes can be increasingly utilized for imparting employment oriented vocational courses.

Animal and poultry rearing :

In the field of veterinary and animal sciences, husbandry practices offer immense scope for vocational training. Adequate training on dairying, rearing of small ruminants such as sheep and goats, rearing of pigs, rabbits and laboratory animals, various poultry birds such as chickens, broilers, turkeys, geese, ducks, domestic quails and ratite birds such as emu and ostriches are becoming immensely popular. Even instructions are sought after on rearing and breeding of dogs and equine. With regard to poultry husbandry, hatchery and brooder management is a technically important requirement. In large poultry enterprises, the requirements include handling of hatching and table eggs, candling and hatchery management, brooder management and packaging and transport of commercial chicks.

Product manufacture :

Dairy products development offers considerable scope for vocational training. The products include cream, butter, ghee, butter oil, paneer, cheese, khoa, chhana, whole milk powder, skim milk powder, beverages, sweets, indigenous dairy products, dairy byproducts such as whey protein concentrates, whey powder, lactose and casein. Canned meat products are appearing in the market. The meat industry is poised to make quantum jump through organized production. Processing of meat products and meat byproducts including slaughter house byproducts can be taken up. Fish industry in export terms has already made global impact. Indian fish and marine products find market in western countries and Japan. Canned fish, frozen fish, different types of marine food, crabs, lobsters, value added fish products such as pickles and byproducts have immense potential for export and thus offer enormous prospects for undertaking vocational training programmes.

Feed technology :

There are several technologies, which can be adopted at the farmers' and industry levels to improve production and productivity of livestock. Fodder preservation and storage methods can be readily adopted at farmers' level. When crop residues are stacked for long durations, they can be treated with urea and stored. Manufacture of compounded livestock feeds, total mixed rations, pellets, energy and protein supplements, high energy rations, trace element mixtures, salt licks, urea-molasses mineral blocks, chelated mineral supplements and densified, crop residue based feed blocks are among the various technologies which need industrial scale up for reaching to the doorsteps of the farmers.

Vocational trainings can also be in various aspects of feed quality assurance, feed storage, preservation and packaging.

Farm management :

Vocational training on clean milk production is becoming very popular. This includes farm hygiene and cleanliness of animals and milkmen. Integrated livestock farm management should also include detailed curriculum on livestock breeding plans and animal housing models.

Quality assurance :

There is a need for right product descriptions, specifications and development of criteria for quality assessment. Rapid assessment for microbial and chemical quality at farm level and detailed laboratory techniques at plant level are essential components of a vocational course. An understanding of soil, plant and feed analytical techniques and various pollutants, contaminants, adulterants and toxicants is most valuable.

Fodder production :

This is mostly a neglected area where the prospects of vocational training are enormous. In the present day context of crop diversification and intensive land use for farming, dairy production based land use is gaining momentum. Dairy animals require green fodder for economic and sustainable production. Vocational training on intensive cultivation of leguminous and non-leguminous fodders, cultivable grasses, grassland development and agro- forestry land use will be an important employment oriented venture not only to support dairying, but also as a commercial proposition since cultivated fodders and legumes are increasingly demanded by the intensive dairy units especially in the peri-urban areas which are presently sustained by high level concentrate inputs.

Veterinary medicine :

Diagnostics in veterinary medicine are gaining importance. Clinical laboratory support for generating basic data for a treatment protocol is being recognized as an essential pre-requisite. The need for training in veterinary radiography, anesthesiology and veterinary nursing is being felt by veterinary practitioners. Though a number of biological products including vaccines, sera, enzymes, hormones etc. are known to be valuable in the treatment and health care of veterinary subjects, the commercialization and scale up production of these materials have to be undertaken by the private industry for which adequate training on procedures, machinery and equipment handling is necessary. Field

level veterinary support in terms of veterinary first aid and animal handling and restraint have to be professionally organized. Training of personnel in the departments of forestry, wild life and animal welfare needs to be organized.

Fishery production :

Carp culture, shrimp culture, ornamental fish culture, integrated paddy cum fish culture, composite fish culture, manufacture of value added products from less edible fish, fish catching methods and manufacture of fishing boats, fishing nets and other equipment and appliances are among the various areas in which need based vocational trainings can be organized.

Social disciplines and upstream areas :

There is an urgent requirement to expose the entrepreneurs to latest information on economics of livestock development, modern methods of extension education, project planning in livestock enterprise, bio-informatics and knowledge management, data base management and various teaching aids and development of simulation models for animal experimentation, software development and manufacture of CD ROMs on case studies, illustrative studies, demonstration of successful technologies and hands-on practices for using computer aids relating to livestock farming and industry.

The important emerging areas include biotechnological applications such as embryo biotechnology, genetic, biochemical and physiological markers, feed technologies, canned meat and fish products, instrumentation, laboratory techniques for quality control, production of nutraceuticals, pharmaceuticals, probiotics and a wide range of machinery and equipment for the livestock industry in the areas of production and processing.

Global trade requirements :

For the vocational courses, the clientele are drawn from different sections of stakeholders and end users. Members from the farming community, village artisans, rural youth, self help groups, entrepreneurs, unemployed professional graduates, personnel from development departments, and personnel from the feed industry, pharmaceuticals, dairy, meat, poultry and fisheries are highly benefitted from such courses.

In the context of globe trade requirements, training also needs to be undertaken on international specifications, standards, descriptions and certification procedures for various livestock products. A large scale awareness needs to be created on patenting, intellectual property rights and policy issues relating to exports and imports.

Follow up :

The titles and contents of vocational programmes need to be constantly reviewed from time to time. For farmers, rural youth and self help groups, the training need to be largely subsidized. Self financing mode can be adopted for the personnel from industry, entrepreneurship building and those from developmental agencies. The impact of vocational training needs to be assessed in terms of immediate and long term benefits for which parameters such as increase in knowledge and skill levels and employment, particularly self employment have to be considered. The feed back on such assessments will help in refining the programmes in tune with changing priorities and needs.

Internationalization of Higher Education in Agriculture : Scope and Needs

A.S.R.A.S. Sastri *

Dean, Faculty of Agriculture, Indira Gandhi Agricultural University, Raipur (C.G.)

Introduction :

The word 'university' of 'vishwavidyalaya' in 'devnagri' itself indicates the scope of internationalization of higher education. It is, infact, no matter of debate, if we think of earlier Indian Universities Nalanda or Takshasila, where a number of foreign scholars visited and gained knowledge and educated themselves in the subjects of religion, philosophy and even politics. There was no need to issue the certificates by those institutions but attending those educational institutes itself was considered as a big achievement and the persons used to be recognized as 'scholars'.

Gone are the days of those glories and recognition to the vishwavidyalays. Now, in the Indian context, Universities have become highly regional and provincial organizations and there is growing pressures to recruit both teacher and the taught from the same province. This is un-ethical.

However in new millennium, the things are being viewed in a different perspective. According to K. Vekatnasubramaniam, Member, Union Planning Commission, Govt. of India, New Delhi the higher education system has to be transformed to make it more socially relevant, information and technology oriented, covering diverse fields and of high quality to meet the challenges of the 21st century. He also mentioned that for many programmes of studies, there is a demand for seats by overseas students who can pay in foreign currency and it was suggested that universities may create supernumerary seats upto 20 percent to enroll such students.

In the present context of "vasudhaiva kutumbakam" internationalization of higher education can bring a sense of global awareness among the youth of the world. Besides this, it can create sensitivity to other cultures and help in developing new language skills. Above all, internationalization can bring intellectual sophistication.

* Presently Director of Research

Internationalization of Higher Education in agriculture :

It is true that atmosphere and environment has no political boundaries. Same crops under same agro-ecological conditions exist in different countries. In agriculture with different ethnic groups in different countries the methods and practices of cultivation vary as per the local conditions. Some of the indigenous technical knowledges (ITKs) may have international applications with viable economic returns. Limiting the higher education within the provinces and within the country can limit expansion of the knowledge. Moreover, internationalization higher education in agriculture can bring greater exposure and recognition to these ITKs. This can avoid conflicts of patenting similar to those of neem or turmeric in treatment of some ailments.

Scope :

The question comes 'what is the scope of internationalization of higher education in agriculture? To look at the scope one need to analyse the status of those developing countries which have mainly agrarian based economies. For example, all the countries in the African continent have similar ethnic diversity with similar crops and crop growing and farming situations as that of India. The success story of Indian food security can become a beacon light to those countries and if the younger generations of these countries are educated under similar environments they can develop the agriculture in their own countries with knowledge gained from Indian SAUs rather than that gained from European, or North American Universities which would be much less relevant. There are so many technologies that are developed in India that can have direct application in those countries. Some of them are:

- a) Tuber crop cultivation and processing
- b) Spices cultivation
- c) Plantation crops
- d) Rainfed rice production technology
- e) Water management
- f) Dryland agriculture etc.

These agro-techniques have more relevance in those developing countries with immediate application, may be with a little bit fine-tuning. The research in India in horticultural crops can also be of high significance to these developing countries. Fortunately, India has all types of climates ranging from equatorial to tropical, sub-tropical and temperate. Also India has diversified soil conditions in each of these climate types.

As such, all kinds of agro-ecosystems of horticultural crops including fruits, vegetables and floriculture exist in India. This creates immense scope to all developing countries including Eastern European countries to get higher education in agriculture in India.

Thus, there is a vast scope for higher education in agriculture in India. It can pave way to the development of agriculture in those countries that are agrarian based.

Needs:

Why should India internationalize the higher education in agriculture? To answer this question one need to look at the functioning of SAUs in India.

The concept of SAUs came to India in 1964 and the state agricultural universities (SAU's) started in a similar pattern as that of American Universities, that is, under 'land grant system'. The main mandate of these SAU's was and still is to provide teaching, research and extension support in agriculture to meet the challenges and needs of the state governments. All the SAU's in India are provided with a large land area (ranging from 1,000-10,000 acres) to conduct research, field demonstrations, imparting instructions to the students as well as for production of quality seeds.

But in recent years financial crises coupled with competing demand for other priority sectors, both the state and central governments have not been able to provide the required finances to these SAUs. In the mean time, these universities have been expanded with micro-specialization and faculty was recruited accordingly. As a result of this, most the budget allocation to these SAU's goes towards payment of salaries and other perquisites.

The ratio of teaching to non-teaching staff is also very high and in some universities it is 5 times to the teaching staff. Though the university farms are large, a major portion of it goes for research which is observation intensive with more financial input. The farm comes under labour laws and in all the labour inputs like wages, holiday's etc. government rules are applicable. As such the cost of cultivation of the SAUs' farms become higher and as a result either the profit margins become low or even negative. In order to enable SAUs' to generate income it has become for them relatively higher necessary for them to attract foreign students and NRIs who can pay fees and in dollars. This would improve the financial status besides providing greater exposure and authenticity to the university expertise.

Present status:

In India the growth of foreign students is not encouraging since last two decades. The growth of foreign students in 3 major countries of Asia are as follows:

Country	Number of students		
	1980	1995	Change
China	1,381	22,755	+21,374
Japan	6,543	53,511	+46,968
India	14,740	11,880	-2,822

(Source: Balakrishna K. Nayar 1991 "The major source countries for international students" In Internationalization of Indian Higher Education (Ed) KB Power, Association of Indian Universities PP 76-83).

The increase in the number of students in 15 years in China and Japan is striking while there is negative trend in case of India. Though no such statistics for the SAUs are readily available the trend must have been the same in SAUs too. This is in spite of the fact that in country like India, there is an added advantage of english being the medium of instruction, which for Japan and China, is a disadvantage.

Unfortunately, India could not tap this advantage. For internalization of our higher education in general and agricultural education in particular it is necessary to:

- a) Encourage student inflow from abroad especially from developing and underdeveloped countries.
- b) Make available contact the academic calendars and curriculum of all SAUs on-line;
- c) International organizations like FAO, UNDP, UNEP and UNESCO should be approached for deputation of students from abroad to our universities.
- d) Evolve umbrella MoUs by the Indian Council of Agricultural Research (ICAR) which is responsible for higher education in agriculture in India with the above organizations as well as with developing and under-developed countries.

The agricultural higher education in India is more relevant to those countries with low Income. Countries like Indonesia, Ukraine, Pakistan and Uzbekistan from where more than 10,000 students go abroad, almost none or very few of them come to India except from Indonesia from where 106 students came to India in 1998-99. The situation with other low income countries is as given below: (1998-99)

Country	Number of students	
	Abroad	India
Kenya	5,876	639
Nepal	2,197	574
Bangladesh	5,779	461
Ethiopia	4,366	403
Sudan	4,396	245
Uganda	1,617	196
Bhutan	118	115
Indonesia	22,136	106
Yemen	6,060	100
Afganistan	3,036	100
Srilanka	5,118	368
Thailand	17,093	197
Iran	22,136	108
Maritius	2,284	398

(Source: as in earlier table)

All these countries have similar agro-ecosystems resembling to that of India and more students can come to India for higher education in agriculture.

SWOT Analysis :

There are several strengths, weaknesses and opportunities as well as threats for internationalizing the agricultural education in India and some of them are as follows.

Strengths :

- India has strongest national agricultural research system (NARS) in the world.
- It has the largest scientific manpower
- India, has a vast experience in evolving innovative and agro-ecosystem based techniques, which led the country to food sufficiency.
- There are 37 SAUs with different specializations. This can cater the diversified needs of various developing countries of the world, better than European or North American Universities.

Weaknesses :

- The international linkage of Indian agricultural education system is very weak.
- We lack clear-cut admission policies related to foreign students.
- The students seeking admission in any of Indian University have to do a lengthy paper work and a large number of agencies involved.

Opportunities :

- But the opportunities for higher education in agriculture are enormous since we have large number of eminent scholars, reputed teachers and distinguished researchers in several fields of specialization
- We have a very strong base of agricultural research for agricultural and horticultural crops of equatorial, tropical, sub-tropical and temperate climates.
- Many developing countries have either identical or similar agro-ecosystem and the agro-techniques developed in India can be directly applied in many countries as such.

Threats :

- One important threat at present we can visualize is the probable germplasm piracy.

To internationalize agricultural education, as mentioned earlier, it is first necessary that first we truly nationalize it by expanding the role of agricultural universities as regional organizations to national institutes. Some suggestions are as follows:

- The quote of out-ofstate students should be increased from current 15 to 25%.
- Many universities have yet not implemented 3rd Dean's committee report, which need to be done in order to encourage inter-university movement of students.
- The policy of some of the universities not to admit students for 3rd degree from same university is good and be followed by other universities.
- The system of visiting scientists and of sabbatical leave is not very effective in India. This should be encouraged in various ways.

Some of the steps, which can be taken-up to internationalize agricultural education, are:

- Making admission process easier and faster Universities should be authorized to directly entertain admission requests, the Indian political mission should accordingly issue student visa.
- Based on closeness in climate and cultivation pattern the Indian agricultural universities, in overall coordination of ICAR, should identify countries/universities from where they can get students.
- The Indian Universities may develop specializations and modify curriculum to satisfy the needs of students of targeted countries.
- To attract students from these potential countries, before we get 'paying' students, the Govt. of India, through Ministry of External Affairs, ICAR, ICCR etc. should offer more scholarships to make them aware of our strengths.
- The teaching standards, curricula, hostels and library facilities have to be up-graded.
- Every Agricultural University should effectively manage its web site giving adequate details of programmes, their duration, medium of instruction, climate of town, specialization of faculty members, achievements of students and university alumni, fees structure, other probable expenses etc.

With above steps, if taken effectively, India can tap the potentials of internationalization of agricultural education, provided the weakness like lack of policies, lengthy paper work etc. are removed.

Vocational Education In Dairying: Opportunities and Challenges

K.C.P. Singh

Dean, College of Dairy Technology, IGAU, Raipur

Debates on development concentrated on economic development as panacea. It was believed that benefits of growth would reach everybody in the process of development. Experience has taught that in addition to income and GDP human resource development can also be considered to measure the development. Since human beings are the means and the end of development therefore human resource can be treat as the root of development.

India after gaining independence chose the path of placement development .The goal of all development effort is to raise the level of well being of all the citizens of the country. India began the process of planned development with the start of the first five-year plan in April 1951.the planning objectives followed from first to tenth plan could be grouped under four head: growths, modernization, self reliance and social planning which encompasses social justice, human resource development, educational growth, eradication of poverty, up liftman of woman and environmental planning

Education is one, which makes an individual to undertake professional activities of life judiciously. The production of large number of educated youth has unfortunately not been commensurate with the development of job opportunities.

The educational structure in India is generally referred to as the Ten + Two + Three (10+2+3) pattern. The first ten years provide undifferentiated general education for all students. The +2 stage, also known as the higher secondary or senior secondary, provides for differentiation into academic and vocational streams and marks the end of school education. In some states, the plus two stage is located in intermediate, junior or degree colleges but is not regarded as a part of the tertiary stage of education. Besides, the technician educational programme has been shown to exist after the ten year of general education.

Secondary and higher secondary education are important terminal stages in the system of general education because it is at these points that the youth decide on whether to pursue higher education, opt for technical training or join the workforce. Educationists and experts have consistently recommended that education at these stages should be given a vocational bias to link it with the world of employment.

The D.C. Kothari Commission, the recommendations of which form the basis of the 1968 National Policy on Education, felt that it should be possible to divert at least 50 per cent of the students completing Class X to the vocational stream, reducing the pressure on the universities and also preparing students for gainful employment. The vocational education scheme at the 10+2 stage came into existence in the late 1970s.

Agriculture is one of the fields which can absorb a considerable number of unemployed educated youth of the country provided he possesses the technical know-how and confidence to use it effectively. Dairying has been an integrated part of agriculture. It is an ancient occupation of rural formed family. As a result our development programmes, dairying is acquiring a commercial status. Development activities are linked up with new concepts, innovations coupled with new areas of research. The technical know-how in dairying has not percolated down to the grass roots level and made the dairyman confident of his job to carry out the activities effectively.

India is the largest milk producer in the world. The dairy industry in India has made rapid progress and presently is growing at the rate of four percent per annum. The delicensing and liberalization of the dairy industry have encouraged massive investment from private sector in this sector. In the recent past a large number of dairies have come into existence in the country and in future more are likely to come. At the same time, knowledge in Dairy Technology is advancing and helping dairy industry to manufacture milk and milk products to meet diversified needs and demands of consumers. Innovations in Dairy Technology have also helped industry to improve its productivity. The Dairy plants require large number of young, dynamic and trained personnel in Dairy Technology to handle various operations in the plant. The demand of trained personnel at the base level is not fully met and there lies a huge gap.

Vocationalization in the field of dairying is a need of hour. Gravity of the problem compels the introduction of the vocational course in the field of dairying to train the middle level youth to man the dairying on sound technical footings with tangible improvement in the present scenario of effective and efficient management of the enterprise.

The scope :

The dairying as a whole starts from animal husbandry to product manufacturing and sale .In the journey of reaching to destination milk travels through various agencies, and situation. The perishable nature of milk needs a skillful and dedicated handling. The various employment opportunities in the field of dairying are as follows :

A
SALERIED
Livestock Assistant / Field Assistant / Stockman / Dairy Assistant / Dairy Kamdar / Veterinary Field Assistant
Milk Procurement Supervisor / Milk Procurement Assistant / Dairy Extension Assistant
Artificial Insemination Assistant/Inseminator
Feed Technician / Cattle Feed Technician / Cattle Feed Assistant.
Fodder Production Assistant.
Dairy Laboratory Assistant.
Dairy Products Manufacturing Assistant / Dairy Dock Assistant / Junior Dairy Technician.
Sales Assistant/ Sales Promotion Assistant / Distribution Assistant.
Farm / Dairy Wastes Supervisor.
Secretary, Dairy Co-operative Society (DCS) / Village Milk Collecting Centre.
Dairy Instructor (+2 level schools).
Dairy Supervisor/Dairy Farm Supervisor.
Secretary Dairy Cooperative Societies (DCS)
Milk Procurement Supervisor / Village Extension Assistant
SELF
Dairy Farm Owner.
Dairy Products Manufacturer.
Cattle Feed Manufacturer.
Fodder Producer.
Artificial inseminator and Pregnancy Diagnosis Services / Inseminator.
Setting up Milk Parlour (Owner / Concessionaire / Retailer).
Bio-Gas Plant Operator.
B
SALERIED
Dairy Dock Assistant / Raw Milk Reception Dock (RMRD) Assistant
Milk Chilling Center Technician
Laboratory Assistant
Junior Plant Operator / Dairy Technician
Marketing Assistant
Store Assistant

SELF
Milk Procurement, Transportation, Distribution and Sale
Manufacturing and sale of Value added products like:
• Plain curd / <i>Dahi</i> / Yoghurt
• <i>Lassi</i> and Cultured Butter Milk
• <i>Ghee</i>
• Butter and Butter milk
• <i>Khoa</i> and <i>Khoa</i> based products
• <i>Paneer</i>
• <i>Chakka / Shrikhand</i>
• Flavoured milk and Sterilized Drinks
• <i>Chhana</i> and <i>Chhana</i> based products
• Dry blended products
• <i>Kulfi</i>
• Candy
• Ice-cream and softy
• Processed cheese and Cheese spread

The reality :

The annual production of milk has increased number of times since Independence and the country now stands as the largest milk producer in the world. The present growth will make the production many fold and will further generate a good employment opportunities for rural youths. In spite of various efforts vocationalization in the field of dairying has not yielded much. Still large number of peoples are unable to adopt this sector as their lively hood. They are still unaware of by various modern practices. They are still being cheated by middle man.

The strategy :

- The course curriculum should be so designed and presented in lucid form to mould the trainee into a competent dairy farmer. After completion of the course the students should confidently choose dairying for self employment or can seek employment with the State departments, private/public dairy farms, milk plants, dairy co-operatives, cattle feed plants, educational institutes, etc.
- To develop the courses which are based on the analysis of job requirements, and should be grouped under a common title of "Competency Based Curriculum". Both curricula and instructional materials should be developed in consulataion with employment sector personnel; curriculum experts, subject experts and classroom teachers participate.

- There is a need to establish linkage between vocational courses at the +2 level and courses at the university level. The present admission criteria for entry into vocational courses at the graduation level also needs to be changed.
- The vocational courses in schools should be competency-based and in modular form with a credit transfer system and provisions for multi-point entry/exit.
- The existing scheme should be strengthened by involving industries through memorandums of understanding, in designing of the course, development of the curriculum, training of faculty/students and certification of the courses.
- Before vocational courses are started in schools, local business and industry should be involved closely in studying the need and for conducting district vocational surveys.

In addition to above following areas may be given emphasis for organizing training programmes at various location for the peoples with different background

- Training course on Animal Husbandry
- Dairy animal health coverage programme
- Artificial Insemination
- Training programme on Dairy animal management & production
- Training programme on collection and storage of milk
- Entrepreneurship development programme for setting of milk processing plant
- Training programme on product processing
- Training programme on salesman ship and marketing of product
- Training programme on quality control and quality assurance.
- Awareness programme for transfer of newer technologies in the field of dairying
- Programme on dairy business on the lines of Agri business.

"Of the Student, for the Student and by the Student" Education and Training Approach of Agricultural Technological Backstopping for Self-employment

A.M. Sheikh

Dean, Anand Agricultural University, Anand (Gujarat)

The population of India has already been crossed 103 billion and is still increasing alarmingly and that put a great pressure on the food grain production of India. On a rough reckoning it is an acceptable fact that India achieved a marvelous success in food grain production from a bare 51 million tons in 1951-52 to 212 million tons in 2003. In spite of this India is still hungry not only in producing additional 50 million tons of food grain by 2010 AD to feed its increased population but also in generating employment opportunity through agriculture and allied fields. This situation poses a major challenge not only for the policy makers but also more directly to the agricultural educationists, scientists and extension personnel to make necessary modifications in agricultural education and training.

Experiential agricultural education and learner centered training approaches have been considered as important elements to answer above situation. With the help of these two, there are ample chances to develop competent, skillful and self employment oriented individuals. Under the changing dynamics of economical and industrial growth, agriculture has undergone a sea change with new approaches. Therefore, experiential system in agricultural academia has become imperative to impart better training to the agricultural technocrats with high level of skill in combination with the modern attitude and management capacity.

Issue of alteration in present system :

Agricultural education needs to be evolved in a very rapid manner to meet the expectation of the society. It is seen that though the students of agriculture are learning substantial basic and applied issues of science and technology, they do not possess adequate confidence in starting their own commercial venture. Under this situation, in formal and informal agricultural education and training approaches, some modifications need to be made in our country. The modern formal and informal agricultural education and training approaches should be a learner-centered approach and allows an individual to be responsible and capable to be self dependent in every aspects of agricultural development. New formal and informal agricultural education and training should be given by using integrated approach which makes person self sufficient and successful entrepreneurs. Following aspects need to be incorporate in integrated approach of education and education.

- Training which provides direct practical experiences of matter to be learnt.
- Understanding new areas of training in the real life situation.
- Development of art of creative thinking

- Building self confidence
- Long term involvement
- Self management
- Determined with problem solving behaviour
- Goal oriented
- Moderate risk taking
- Dealing with failure
- Taking initiatives and seeking personal responsibility
- Use of available resources
- Managing conflicts
- Competing against self obligatory standards
- Tolerance of ambiguity and uncertainty
- Modern technology adopter
- Time management
- Quality production
- Budgeting
- Input management
- Banking procedure
- Government policy
- Marketing intelligences
 - Skill of marketing
 - Value addition techniques
 - Availability of raw materials
 - Government priority in productions
 - Export oriented productions and possibilities
 - Profitability
 - Cost/ Benefit
 - Proper risk taking ability in marketing

Thus important characteristics of self employment oriented entrepreneurs are drives and energy, self confidence, long term involvement, money as a measure, persistency in problem solving goal, orientation, moderate calculated risk, dealing with failure, use of feedback, taking initiative and seeking personal responsibility, proper use of resources, competing against self-imposed standards, internal locus of control and tolerance of ambiguity and uncertainty. Factors responsible for starting new enterprise are availability of market, availability of raw materials, availability of skills, government priority, and availability of technology, strategic fit, ease of implementation, risk exposure, profitability and cost benefit ratio.

It is remarkable to note that Anand Agricultural University (AAU) has adopted integrated training approach to install above listed elements among the students to make them confident, able and competent in starting their own commercial ventures. The Bakery Training Centre, Mali Training Centre, Poultry Training Centre and Vidya Dairy are unique examples where learner centered "Of the Student, For the Student and By the Student" approaches are being executed by AAU. Here Vidya Dairy approach is explained in detail.

VIDYA DAIRY: "Of the Student, For the Student and By the Student" - Integrated Approach of Training:

The Vidya Dairy is the first dairy in India primary run by the students. It was established in 1994 and provides one year hands-on training to the B.Tech (Dairy Technology) students of SMC College of Dairy Science of Anand Agricultural University.

To impart self-sustainable skills for survival in a commercial environment and develop professionalism in dairy technology graduates, a commercial dairy plant called Vidya Dairy was conceived and established in the early 90s at Gujarat Agricultural University (GAU), now renamed as Anand Agricultural University (AAU). This was an innovative and need based experiment introduced in Dairy Technology academic schedule to narrow the gap between academia and the real world.

It was established to provide one year hands-on-training to the B.Tech (Dairy Technology) students of SMC College of Dairy Science of Anand Agricultural University. So far the dairy has trained 415 students. For students studying the four year dairy technology course at AAU, one year of their college is dedicated to hands-on experience in dairy plant operation and management. Their curriculum for third year is designed with a vision to provide outstanding training both on technical and commercial front. In other places too the concept of student training dairy does exist but the facility and commercial viability of this plant makes it unique and one of its own kind.

Training method :

The students of third year of B.Tech (Dairy Technology) programme, after initial grooming of 2 years at the college, come to the Vidya Dairy for training for full one year. During this period they work with their own hands under the supervision and guidance of plant supervisors and / or the teacher-in-charge. They are essentially the skilled work force to the dairy plant capable of not only physical work but are made technically skilled enough to manufacture quality products with minimum wastage. This intensive hands-on-training in processing and product manufacture with emphasis on commercial viability enables the students to develop practical skill, professional competence and work culture, which is necessary for becoming a successful professional. A series of guest lectures are arranged drawing resource persons from the industries, statutory bodies and apex organizations, including the vendors and scientists.

Facts and Figures :

Vidya Dairy has an installed capacity of handling 1,00,000 litres of milk per day. At present it is handling about 65,000-70,000 litres of milk per day and managing a part of the liquid milk market of Anand. Gujarat Co-operative Milk Marketing Federation Ltd (GCMMF) markets the milk products of this dairy, under the brand name of AMUL. Vidya Dairy promotes professionalism amongst its students. Dr. Norman E. Borlaugh, Nobel laureate, on a visit here appreciated its staff for their zeal and passion. Mr. Bimal Jalan former

RBI Governor was highly impressed and emphasized the need to introduce similar model of training in other professional areas.

The VIDYA DAIRY has been established on 20 acre land of AAU by the financial support of Rs. 150 million by National Dairy Development Board (NDDB) on a turnkey basis. The dairy has been involved effectively with other related institutions and the commercial units to take up product and process development and to face the challenges of dairy sector. The learner centered training component, commercial viability and commitment and involvement staff and the students are the important elements of this unique training centre. It receives milk from the Kaira District Milk Producers' Union Ltd., (Amul Dairy) through the Gujarat Co-operative Milk Marketing Producers' Union Ltd.

A range of Amul branded milk products is manufactured at the dairy, which includes Liquid Milk, Ghee, Ice Cream and varieties of Cheese. The dairy has also contributed in the process and the process and product development and test marketing of Amul Ice Cream, Amul Mozzarella Cheese, Amul Emmental Cheese and Amul Frozen Diced Paneer in association with the NDDB and the GCMMF.

The dairy attained the status of a Company in 1998 under section 25 of Companies Act 1956 and is strongly supported by NDDB, GCMMF, Amul Dairy and Anand Agricultural University. From day one of the dairy's inception highest priority has been given to quality. In order to achieve excellence in quality the dairy had taken many initiatives and was the first in the country to be certified for HACCP and ISO-9000 in the year 1998 by QAS, Australia (now SAI Global) a well reputed international certification body. Further, the dairy has successfully implemented Total Quality Management as a tool for involving all the employees of the organization to work towards excellence.

Thus the dairy has many first to its kitty like it is the first dairy in India primary run by the students, first to manufacture Mozzarella Cheese commercially, first to manufacture and commercial launch Emmental Cheese (Piccolo), first to be awarded the coveted HACCP-9000 certification by Quality Assurance Services, Australia, it is also approved by Export Inspection Agency: Mumbai for export for Pizza Cheese, Emmental Cheese, Paneer and Ghee, Awarded letter of appreciation by Gujarat Government in the field of energy conservation. In addition this dairy is winner of Safety Award 2000 by Gujarat Safety Council and winner of National Quality Award. Recently Vidya Dairy was also awarded the prestigious "Rajiv Gandhi National Award 2003, Commendation Certificate" for Large Scale Manufacturing Food & Drug Industry. The dairy has a combination of indigenous and imported equipments to process milk.

Scopes of generating self employment in the agricultural and its allied fields :

As discussed earlier that integrated approach of training gives best results in providing direct learning experience to the learners. There are many areas of agriculture and its allied fields where proper training can create self sufficient and employable human resources for nations. It is well known fact that the self-employment or entrepreneurship

development in the agricultural and its allied enterprises is a crucial factor in economic development of our country. There are enough scopes in solving unemployment problems and inculcating a spirit of self-reliance in the prospective entrepreneurs. With the implementation of right type of programmes, the desired entrepreneurship or self employment can be encouraged among rural youths and agricultural graduates in following aspects in our country.

1. Agriculture related :

- Seed Production
- Compost making
- Vermi-culture production
- Plant Protection services
- House hold Pest Control services
- Agricultural Consultancy Service
- Nursery of transplanting crops- Tobacco, Paddy, etc.
- Land hire from those migrant persons who have big land in rural area

2. Horticulture related :

- Bonsai Production
- Nursery: Vegetable crops, Flower crops, Ornamental plants, Fruit crops
- Apiculture
- Kitchen Gardening services
- Developers of Gardens around Bungalows, Institutions, Hotels etc.
- Sericulture enterprise
- Flower cultivations
- Service providers to farmers adopting drip irrigation, sprinkler irrigation and precise farming

3. Value addition related:

- Value addition by packaging of pulses, serials, spices,
- Value addition by packaging, chips packaging.
- Value addition through pulse milling
- Production of serials by natural farming concept for higher prices
- Production of vegetables and fruits by natural farming concept
- Fruit and Vegetable preservation (Pickles, Jam, Galley, Catch-up , Juices, Fruits Candy productions)
- Production of Cut flowers and other flower Preparations
- Bamboo toys, and its other preparations
- Value edition by growing sweet cone maize and its preparations
- Production of ornamental fish for aquaculture

4. Live stock, Animal Husbandry and Dairy related :

- Cattle farm
- Poultry
- Goat keeping

- Fish Farming
- Piggery
- Duck farming
- Dog raring
- Dog beauty and health clinic
- Horse farm
- Animal feed
- Milk Dairy and production Milk Preparations

5. High Tech related :

- Tissu culture
- Contractual farming
- Precise farming
- Mushroom cultivation

6. Agricultural Communication and Extension related :

- Private extension services
- Production of agricultural Audio-Video Cassette, CDs, Charts
- Publication of Magazine/Agri. Journalist/Television reporters/Agricultural Columnist
- Organizer of Agril-fair/Exhibitions/Mela/Trade fair
- Publication of Magazine
- Production of web sites
- E-commerce
- Agricultural accounting
- Adviser of export marketing

Thus, looking to the self-employment opportunities, we should try to explore all possibilities in the fields of formal and informal training and education in case of agriculture and its allied fields. Total training approach is a demand of present age so all educational and training institutes should try to install all the qualities among the learners so that we can make them useful citizen of our country.

CONCLUSION :

The development of self-employment is a crucial factor in the agricultural and its allied fields of our country. This aspect will go a long way in solving unemployment problems and inculcate a spirit of self-reliance in the prospective entrepreneurs. With the implementation of right type of programmes, the desired entrepreneurship can be developed in the country. It is realized that in our country bigger problem is not unemployment but more number of unemployable youths is crucial problem. With the implementation of "Of the Student, For the Student and By the Student" Integrated Approach of Training and education there are ample chance to create employable youths in the agriculture and its allied fields. What we need today is practical oriented, real situation oriented, problem solving oriented, confidence building oriented total training and education approach to be implemented to solve the problem of unemployment rural youths.

Standardization and Uniformity in Course Curricula in Horticulture and Forestry

B.S. Chundawat¹ and G.S. Rao²

¹*Vice Chancellor, S.D. Agricultural University, Sardarkrushinagar, Gujarat*

²*Senior Scientist, S.D. Agricultural University, Sardarkrushinagar, Gujarat*

A consistently gradual diminution of employment opportunities in the organized sector conjoined with subjugation as well as insecure nature of private sector job compels today's youth to embrace entrepreneurship as the only means to earn comfortable live hood without pledging self-esteem. Under the prevailing scenario, the Universities could play a vital role in motivating their graduates to opt for self-employment through nurturing entrepreneurial aptitude and requisite competence by means of effective backstopping.

Standardization of course curricula: The under graduate course curricula for B.Sc., Horticulture and Forestry programmes has been designed in such a way to ensure excellence of the content with due emphasis on hands on practical experience as well as conceptual back ground of basic, core agriculture and horticulture/forestry sciences and applied technologies. Thus, the syllabus of individual degree programme remained holistic at large without sacrificing flexibility and versatility. The crux of Deans' committee Report was to preserve the unique nature of individual programmes for ensuring the purpose with which they were designed, developed and revised to absorb present and future shocks. Further, the syllabus assures optimum uniformity, while the locally prevailing standards of teaching, examining and evaluating approaches vary with time, place w.r.t. facilities and teachers'/ students' commitment with in a particular setup. Uncompromising adherence to excellence preserves the quality of the products, while any sort of indifference predisposes to dilution of standards. With institutional accreditation becoming mandatory, competition imposes quality assurance and uniformity assumes pivotal importance to the students seeking parity of institutional rating.

Adoption of period/location specific reforms to ensure need based contextual relevance of the students depending upon the their aptitude as well as the prevailing global/national scenario, without over burdening. The modified format of the RAWE programme focused much needed thrust upon development of specific skills based on the mindset as well as the innate capabilities of students. The students of horticulture get hands on practical training in the fruits/vegetables processing units, post-harvest handling units, cold storages, input supplier chain and orchid management on contractual basis.

Similarly, the students if forestry stream receive exemplary guidance from the forest research and training institutes located with in and outside Gujrat state. Such kind of exposure obviously enhances the professional skills and confidence. Notwithstanding the acquired knowledge and exuberance, a embarking upon unknown territory, especially incase of those without such family background.

Constrains in motivating entrepreneurship as a means of livelihood security:

- Quite a few colleges of SAU's possess faculty of specialized in agri-entrepreneurship. They also find it difficult to retain the services of business management experts on long-term basis because of comparatively sluggish career prospects, modest remuneration and lesser job satisfaction.
- A successful entrepreneur rather than an academician is better suited to motivate students towards self-employment.
- Lack of elective courses on agri-entrepreneurship and negligible institutional linkages between Agricultural Universities and agro-business enterprises and Specialized institutes.
- Generalized apathy/aversion towards the business compared to well defined jobs specially chose in government/multinational organizations.

Remedies:

- Regular post-graduate programme in agri-business management/agri-entrepreneurship should be designed and introduced in SAUs.
- Part-time/Short-term courses (Diploma/Certificate) in select areas of food preservation/processing for value addition and marketing.
- The Directorate of Student Welfare through placement and counseling Bureau could arrange students' get together programme with successful entrepreneurs to motivate the students towards business as a promising career option.
- The institutes should enroll students for different "Earn while you Learn" type activities in the University Farms.
- Last but not the least, the dogmatic mind set perpetuated by pseudo-socialists viz., business is always fraudulent and profiting is a sin should be erased by teachers and guides. A successful businessman serves the society better than a plagiarizing academician or scientist or socialistic theoreticians.

Conclusion :

Self-employment is indispensable Businessman as job-providers nourish many saplings to bloom and flourish.

Linkages between State Agricultural Universities and Industries

R.K. Sahu

Dean, Faculty of Agricultural Engineering, IGAU, Raipur (C.G.)

With the diversification and modernization of agricultural system, there is a need to augment support and extension services for agriculture. Setting up Agri-clinics and Agri-business centers with the support of NABARD is the first step in this direction. This will strengthen transfer of technology and extension services, providing self-employment to trained agricultural graduates. Small Farmers Agri-business Consortium (SFAC) has initiated the programme, which is being coordinated by National Institute of Management, Hyderabad (MANAGE) through selected centers across the country. Once agri-entrepreneurs setup their agri-clinics and agri-business centers, SFAC will also support in establishing linkages for sustainability. Singh 1985 classified the farm machinery manufacturers in the country into five categories viz. large, medium, small and tiny scale industries. In addition village artisans, mainly blacksmiths and carpenters, manufacture bulk of hand tools and bullock drawn machinery. The classification of industries is based on the total capital investment, irrespective of the manpower working in the industry.

SAUs - Rich in trained human resources : The SAU's has highly trained human resources. The scientific (engineers and bio-scientists) and skilled technicians represent the disciplines of agricultural engineering, soil science, agronomy, plant protection, bio-chemistry, micro-biology, food science, home science, extension, mechanical engineering, electronics and instrumentation, computer application, statistics, economics, industrial management and agri-business. It has facilities for undertaking research and development in the area of agricultural mechanization, irrigation, plant protection, ergonomics, human engineering and safety in agriculture, post harvest processing, value addition, engine testing, energy management utilizing mechanical and renewable energy sources (bio fuels, plant oils and hydrogen fuel cell). The computer center helps in design of machinery and prototype workshop facilitates machinery fabrication for extensive field evaluation and pilot introduction.

Supplementary Mandate of SAU's to strengthen linkages with Industries :

The mandate of SAU's be broadened to include following in order to strengthen linkages with agro-processing and agro-machinery industries.

- To provide leadership and coordinate network of research with relevant industries to promote mechanization and value addition through generation of location specific technologies for agricultural machinery industries utilizing available local energy resources.
- NGO's, farmer's organizations can serve as catalyst to strengthen links between SAU's and industries to fulfill the need of farmers through promotion of the demand driven technologies.

- SAU's be recognized as Nodal Center for extending resources and imparting training to the agricultural graduates willing to become agri-entrepreneurs. The training programme should include Entrepreneurship Development & Business Management as well as skill improvement modules in chosen areas of activity.
- Establishment of few operational processing plants with technology and service support infrastructure for commercial production of rice based value added products such as pressed rice, puffed rice, rice flake, energy food and other fast food, fish meal, poultry & animal feed and value addition at rural level.

Agriculture sector a promising industry :

The agricultural sector in India is crucial for the economic development and well being of the country. The Government of India is committed to protect the interest of nearly two-thirds of the country's population that constitutes the farming community. Besides the farmers, the Government is also equally concerned about the interest of the food-processing sector. A vast majority of the enterprises in this sector are small and medium enterprises in the small scale and cottage industries category. While we want our agricultural producers and agro-processing enterprises to become competitive and efficient, and be able to compete in the global markets, we shall ensure that the implementation, of WTO provision will not expose them to unnecessary hardship and unfair competition from other countries.

Changing scenario in context of WTO :

The Agreement on Agriculture (AOA), finalized during the Uruguay Round of GATT and the establishment of the WTO, have been received with a mixed response in India. Changes in domestic and external trade policies in line with the provision of the WTO rules, many fear, may result in an adverse impact on domestic agricultural production and agricultural exports and imports thus can affect the country's food security. The protagonists on the other hand, consider these developments as being favourable for the country since changes in policies implemented by other nations will, they believe, give a boost to our agricultural sector and emerging export opportunities will act as a catalyst for the development of agro-industries in the country.

As regards food processing industries, it is required to process, store, sort, grade and market horticultural produce. Modern food processing industries have given a boost to farmer's income. Establishment of agri-based industries with SAU's as its nodal center will provide impetus to translate the vision into reality and will bring prosperity to the people of the region.

High Potential Areas (suitable for adoption of Demand driven technologies) where the linkages are required :

- Low cost polyhouse technology for off-season vegetable production.
- Low cost micro irrigation system for plantations and vegetables.
- Solar tunnel dryer and shredder stone extractor machine Amla processing, making jelly etc.
- Fabrication of low cost ice cream freezer for use at house holds level.
- Setting up plants for processing and oil extraction of Medicinal and Aromatic crops.
- Maintenance, Repair & Custom Hiring of Agricultural Implement and Machinery including Micro-irrigation Systems (Sprinkler and Drip).
- Low cost grain storage structures. Setting up of Metallic/Non-metallic Storage Structures and Rural Godowns.
- Seed processing and testing units.
- Animal feed processing and testing units, including Aqua feed Pilot plant.3
- Galvanized iron corrugated silos are economical over R.C.C. and M.S. silos for storage of food grains. There is need to propagate these silos which is expected to save colossal losses in food grain storage.
- Value Addition Centers.
- Post Harvest Management Centers for sorting, grading, standardization, storage and packaging.
- Retail marketing outlets for processed agri-products.

Support to Tractor and Agricultural Machinery Industries :

Looking to the present market demand and potential of value addition, development scope in near future and quality requirement for domestic use and export the following recommendations are proposed in the area of mechanization of agriculture:

- Based on the location specific research, the SAUs have a pivotal role to provide prototype of the important machinery and to develop jigs and fixtures for commercialization of research prototype.
- Based on the anthropometry and concept of human engineering, appropriate machinery development and subsequent transfer of technology to industries for commercialization of these machinery/implements is a gigantic task to be performed by the sound linkages between SAUs and industries.
- Intensive training of rural artisans and technicians of industries can be undertaken by SAUs with close coordination of industries to improve upon the local skill and talent to promote mechanization in the state. This will further promote mechanization in the rural areas.
- The Tractor and Agricultural Machinery Manufacturers Association should conduct yearly seminars on tractor and machinery problems and prospects of the industry by collaborating with the SAUs, National Academy of Agricultural Sciences, and Indian Society of Agricultural Engineering etc.

- Similarly for better linkages with SAU's, Tractor and Machinery Manufacturers Association should organize seminars on farm mechanization in order to benefit the industry for development of special purpose tractors for cultivation of rice and plantation crops with suitable farm equipments for harvesting, spraying etc. Tractors Manufacturer's Association should establish R & D and Testing Center for their products on the pattern of Automobile Research Institute, Pune.
- BIS standards on pump-sets should be reviewed for ensuring higher performance efficiency and productivity of the industry. The government and SAU's should intensify dispersion of knowledge and information to farmers for selection and better utilization of pump-sets.

Agricultural Mechanization Status :

Rapid strides have been made in agricultural mechanization sector in the past few decades. It is helping in maximizing the efficiency of agricultural inputs thereby increasing productivity. India follows a policy of selective mechanization. It is predominantly taking place in operations where traditional practices have failed to achieve timeliness of operation. Equipment and machines for seedbed preparation, sowing, irrigation, plant protection and threshing operations have become more popular as compared to other operations. The population of tractors, power tillers, diesel engines and electric motors have increased manifold during the last 3 decades (Srivastava, 1996). The time series power availability in Indian Farms is given in Table 1.

Table 1: Time-series power availability on Indian Farms

Year	Total Power availability kw/ha	Source wise, %		
		Animate	Mechanical	Electrical
1961	0.31	94.9	3.7	1.4
1971	0.36	79.2	16.3	4.5
1981	0.63	48.2	32.3	19.5
1991	0.92	34.5	34.7	30.8
1995	1.08	25.9	40.8	33.3

Source: Srivastava, NSL (1995). India: Country Report Presented in the 18th Session of RNAM TAC meeting at Nakhon Ratchasima, Thailand during November 4-6, 1995.

The entire need of agricultural machinery estimated as Rs. 10,000 crores annually is met through local manufacture. There are more than 20,000 manufactures of agricultural machinery of which about 500 are in medium and large scale sector manufacturing tractors, combines, power tillers, pump-sets, drip irrigation system, plant protection equipment, engines and electric motors.

With annual investment of Rs. 10,000 crores the mechanization level is increased by about 1 per cent annually. The indigenous production of tractors which started in 1960 has reached to a level of 2,55,690 tractors in 2000-01 and India has emerged as number one

tractor producing country in the world. The production of power tillers in the country was 17,315 during 2000-01. Record production of 2,78,556 tractors was in the year 1999-2000.

Priority Areas in Agricultural Machinery :

Presently the agricultural machinery are being used primarily for production and processing of food crops (cereals, pulses and oilseeds). The major emphasis during the last about 3 decades have been on development and promotion of hand tools, animals drawn equipment and low hp power operated machines. With modernization and diversification of agriculture and expansion of market due to GATT agreement. The demand of agricultural machinery in future will be more for high capacity crop production equipment to be used on custom basis and post harvest equipment for primary processing, value addition, food processing, handling, packaging, quality control, storage and transport of food crops, horticultural crops, animal products and fisheries for domestic consumption and export.

Production and Processing of Food Grains and Oilseeds :

- The power availability on the farm will have to be increased from present level of 1.08 kW/ha to about 2-2.5 kW/ha mainly through mechanical and electric sources. Demand of tractors for farm operation and electric motors and diesel engines for stationery work will increase. Use of renewable sources of energy in agriculture will also increase.
- The use of equipment on rental/custom hiring basis will be the main focus of small and marginal farmers in due course of time. Demand of high hp tractors, combines, high capacity threshers and other equipment will increase.
- High capacity rotavators and till-plant machines run by tractors will be in demand in future.
- For efficient utilization of water, sprinklers and drip irrigation systems are being employed. Their use, in future, will be increasing.
- Demand for mechanization of rice transplanting, sugarcane harvesting, cotton picking, mechanization of pulse and oilseed crops, potato, hill agriculture, plantation and other crops will be increasing future.
- Equipment for on farm clearing, grading, sorting polishing, decartication and primary packaging of cereals legumes and oilseeds.
- Technology upgradation for milling of rice and pulses for higher recovery, lesser pollution and energy efficiency.
- Technology for production of quick cooking rice, ready to cook chapaties from wheat, dal analogues, quick cooking dal, fortified dal and extrusion processing of cereals, pulses and by products for preparation of snack foods and feed.
- Technology for utilization of coarse cereals for higher acceptability, blending/fortification and Industrial applications.
- Improved technology for production of traditional snack foods from cereals such as pressed rice, puffed rice, roasted bengal gram, rice flake, salted, roasted, fried and flaked products and energy foods.

- Improved technology for sorting, grading, dehusking, decorticating and value addition of coconut, water chestnut etc. their packaging, handling and safe storage.
- Improvement in mechanical and extrusion expelling of oilseeds for higher recovery and foodgrade chemical free oilmeal.
- Safe storage of oil bearing materials, oils and cake.
- Up-gradation of traditional technologies and equipment for production of seeds their packaging and storage.
- Increased use of plastics in irrigation system, covered cultivation, packaging, grain storage etc.

Production and processing of horticultural crops :

About 30-40% of horticultural produce are spoiled due to improper harvesting, handling, packaging, transport and storage for want of appropriate harvest and post harvest technology. Export of cut flowers from India to other countries is increasing. Its potential in future is quite high. Future demand of agricultural machinery for horticultural crops would be in the following areas:

- Good quality horticultural tools, scissors, secateurs, prunners, shears, budding and grafting knives and other hand tools.
- Micro irrigation system.
- Suitable machinery and technology for protected cultivation.
- Equipment for cleaning, grading, sorting, slicing, handling, pre-cooling, packaging, quality control and transport of fruits/vegetables and spices to minimize losses, enhance shelf life and to check distress sale.
- Controlled/modified atmospheric storage/packaging of fruits and vegetables for enhancing shelf life for better quality and cost reduction.
- Post harvest technology of fruits, vegetables, cutflowers and spices for value addition and seeds for further multiplication.
- To update the post harvest processing & packaging technology for export oriented products.

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Industry-SAUs Linkages for Agro-Processing, Marketing and Employment

M. M. Agrawal

Vice Chancellor, C. S. Azad University of Agriculture & Technology, Kanpur

Education is the bed rock of agricultural research and developing the competence of human resource generated through the educational system critically influences the pace of progress. It is a tribute to the leadership of post independence India, both technical and political, that the value of science and technically input into the developmental process was recognised and strong agricultural research and education system was developed. It is on the strength of this national grid that India has been able to achieve the capacity to feed its people in spite of the fact our population has grown several fold since independence. Starting from a large deficit in the domestic production of cereals and other food grains, the scenario changed to such an extent that we were able to build up sizable stocks of food grains. Thus, from a production of about 50 million tones of cereals at the time of Independence, the production increased by four folds during seventies and now we are in a position to build up a buffer stock, which enable us to handle the calamities.

The aim of Agricultural Universities in the next plan should be re-orientation of their educational and research programmes to meet the challenges of sustainable agriculture and food security. Such a restructuring will involve training of students in the principles of ecology, gender and social equity, economics and employment generation. There has to be clear understanding of the purpose of agriculture education. It is the context of the requirements of high quality that makes linkages assume importance. Quite clearly the needs of the present are very different from requirements of. The past and future will call for yet qualitatively very different expertise in kinds and levels. Disciplinary excellence will continue to be important but interdisciplinary functioning will gather overriding value. Also the areas in which expertise is relevant will have highly dispersed, wide spectrum and the level of expected expertise will have to be very high. Consequently no single institution will have expertise in all the areas at levels of advancement that will become an essential requirement. In such a situation, linkages, collaborations and joint venture with necessarily become matters of imperative rather than choice. Sooner this fact is realized and incorporated in our system of operation, the better it would be for achieving the goals of quality.

The paradigm shifts in agriculture, which has been a way of life rather than run as a business venture, are necessary if it has to compete in view of WTO entailing high quality and competitive price, the required changes will also have to be put in place. The most promising and low cost solution to find the avenues for income and employment generation in the rural areas in value addition and processing as an additional activity by the farmers/producers and their families. There are many products which can be primarily processed in the production catchments like grain milling, pulse milling, oil milling and

production of traditional snack foods and also products from printable commodities like fruits and vegetables.

Diversification in Agriculture has been acknowledged by the Govt. of India since mid-eighties to make agriculture more profitable, generate employment for rural masses and conserve natural resources. Diversification to horticulture is the best option as these crops not only meet the above requirements but also have several other advantages. These crops are adapted to a wide range of climate, produce higher biomass than field crops per unit area, more remunerative for replacing subsistence farming and thus alleviate poverty in varied agro-eco systems like rainfed, dry land, hilly and coastal ecosystem. They have potential, for improvement of wasteland through planned strategies. These crops need comparatively less water than many other field crops and provide higher employment opportunities. These are important for nutritional security as well as for healthy environment. Horticulture crops contribute 18.8% to GDP from 6.1% of the cropped area and have a higher potential for value addition and foreign exchange earning.

In the present situation, it is necessary to see that the steps taken from now on in the field of agricultural production should be concentrated on areas, which hitherto had not received sufficient attention, nor special incentives. In the above context, it is now required that the Industry-agriculture should become more complementary to each and the terms of trade should be made more effective through adoption of suitable macro economic policies so as to strengthen the interface between these two important sectors of Indian economy. In doing this, coordinated efforts of agricultural scientists, planners, industry and user groups in demand assessment, production management and efficient distribution so as to achieve the goals of increased agricultural production to meet future demands is necessary. The above goals could be achieved through building strong interface/ interaction mechanism between agriculture and related agriculture industrial units.

Agro-based industry in India is an old tradition, but it has picked up very fast only after 2000, because of the new economic policy. Industry requires the raw material that is processable but that is not available as demanded. Biorevolution makes conditions more suitable for agro-processing industries to come up. Bio-revolution coupled with agro-processing helps farmers realize considerable value addition from their crops. Last century had witnessed a critical transition in agriculture. This transition is from a system that has been historically dependent upon the use of natural resources to one that has relied on science and technology to increase agricultural yields. It is widely recognized that increased yield or increased production efficiency have been, and will continue to be, critical for agricultural competitiveness. Knowledge intensive agriculture had helped agriculture in the developed countries and this is largely due to the presence of well established public and private technological structures.

The industries related to agriculture are based on agro-industry principle in developing countries i.e. whatever is produced is processed. But due to open global market and competitiveness, it is now necessary to change the thinking as "industry-based agriculture" and not agri-based industry. The capacity of the new technological tools to shorten the historical lag between basic biological discoveries and product development has additionally motivated the trend towards privatization. Finally the growth of venture capital firms most apparent in the countries like U.S.A. and largely limited to the developed countries, has contributed significantly to the development of biotechnology industry through support for small entrepreneurial academic like companies.

The agro-industry is providing the crucial backward and forward linkages between farm production and industry and thus accelerates agriculture development. Backward linkages are created through input servicing and forward linkages are created through processing and marketing. An agro-processing unit can open up new crop and livestock opportunities to the farmers and thus initiates the change process in farm economy. Most of the agro-based units, particularly agro-processing units suffer from the problem of under utilization of capacity. Besides there are sharp yearly variations in capacity utilization due to fluctuations in agricultural production which causes fluctuations in availability of raw material and demand for inputs.

There are indications there that the emerging trade and demand scenario would be more favourable to agro products like fruits, flowers and marine resources but our food processing industries lacks diversification to take advantage of the favourable climate. This is not so much due to the required changes in cropping pattern, as our entrepreneur farmers have been found to respond quickly to the incentives. The main constraint is institutional that is, effective organizational arrangements for purchase of farm output produced for agro processing. The industry must come forward to forge linkage with producers for developing mutually beneficial ties in production and processing diversified products.

Value added products are now attracting more of the export market like oleo chemicals, oleoresins, and essential oils and hence development of new value added products in spices, coconut and cashew will go a long way in export promotion. Development and popularization of newer processed fruits and vegetables are ready to serve food items; modernizing processing units and capacity of existing units need to be encouraged. The prescribed international and domestic SPA standards should be disseminated and adhered to.

Net returns to investment in research and design (R&D) generally come with a time gap due to which importance of return to R&D is often under-realized. Investment in R&D by agro-industries are abysmally low and the industry depends almost entirely on the research and new product developed by public sector scientific institutions like State Agriculture Universities and Institutes. In order to take benefit of the emerging developments in science and technology and to tune their activities to the fast changing

market demand, due to participation in WTO, agro- industries must develop either their own R&D system or fund the research in areas of their interest in public sector institutions like State Agricultural Universities. For this purpose linkages between industry and institution should be developed effectively. This can be achieved only by creating awareness through organizing National workshop/Symposium in which MOU can be made between industry and institutions for need-based research.

Perspective Plan: The process of agro-based industrialization is expected to get a boost in the country with the progress of economic liberalization and in the wake of rising demand for various agro-based products for direct consumption, industrial use and exports. Share of agro-based exports is more than 33 per cent of total exports from India and there is a good scope for substantial increase. The industry has begun moving into non-conventional new products like use of paddy straw for paper and paper boards, bagasse, use of banana stem molasses and cassava and maize for producing chemicals, producing medicines from medicinal plants, roots, processing of fruits, vegetables, fish which is a healthy trend. The changing domestic and international demand scenario and emerging trade patterns have opened vast opportunities for products of agro-based industries. Exploitation of this would require strong and efficient marketing system and strengthening of linkage between the industry and agricultural products and production.

Therefore, there is a strong reason for industry to come out with funds to support agriculture and it is strongly argued that industry should earmark a part of their profits to promote and finance the development of agriculture. Specific requirement of an agro-industry can only be fulfilled provided there is strong linkage with the State Agriculture University. Sometimes the University has desired information but it could not be passed since industry never had linkage.

Therefore, there is a need for the industry to interact with the University and seek help for information and technology development. Alternatively, the Universities can undertake appropriate R&D activities and help the industry by establishing enduring linkages. Prioritization of the linkage taking into consideration of urgency, feasibility and sustainability have to be worked out in the presence of the representatives of both the University and the industry.

Scope:

The University is becoming increasingly popular among the industrialists by directly understanding their problems, need and trend towards their future expectations. The export promotion and allied University support in such areas are the future delivery from the institution. Thus research orientation is focused in these lines and a fruitful research by faculties of SA Us is contemplated. The industry and institute should go hand in hand for their mutual progress. Today's trend is towards Industry-University alliances evolution of centres of specialized excellence and cross border collaborations with globally networked firms and working with diverse corporations. The objective of all these is to do research for better, new and cost effective. This demands that we should join forces in moving towards better R&D. The University has skilled and intelligent staff but is not strong regarding modern infrastructure. The industry may be able to concentrate on some basic research aspects. So, if they plan and work together they would produce fruitful results.

Industry-SAUs Linkages for Agro-Processing, Marketing and Employment

S. A. Patil¹ and V. R. Kiresur²

¹Vice-Chancellor, UAS, Dharwad, Karnataka

²Head, Project Planning & Monitoring Cell, UAS, Dharwad, Karnataka

Rapid agricultural growth continues to be the key to poverty alleviation and overall economic development in India. Agriculture accounts for about one-fourth of the Gross Domestic product and is the source of livelihood for nearly two-thirds of the population in the country. The agriculture sector in India has been successful in keeping pace with the rising food demand of the burgeoning population. Foodgrains production more than quadrupled since the early 1950s from 51 million tonnes to over 209 million tonnes in 2000, while population nearly tripled from 350 million to one billion during the same period.

The Green Revolution has been the cornerstone of India's agricultural achievement, transforming the country from one of food deficiency to self-sufficiency. While recognizing the impact of the Green Revolution in imparting dynamism to the agriculture sector, it must be recognized that the Green Revolution remained restricted to the well-endowed irrigated areas of the country. Of late, deceleration in production and factor productivity growth in some of the major irrigated production systems, especially in the North and Northwest regions, have been recorded. Potentially high production areas (Eastern and Central States) are still lagging behind in productivity increases. Moreover, in the area of agricultural research, the success has been restricted to selected crops and agro-ecological situations. Even in this arena, a growing disparity between the actual and the potential yields points to a crucial gap between research and extension.

Public research and extension played a major role in bringing about the Green Revolution. In the post-Green Revolution era and more so in the LPG (Liberalised, Privatised and Globalised) Trade era, however, agriculture faces many challenges. The changing economic scenario in India due to the evolution and transfer of appropriate agricultural technologies on to farmers' fields in order to respond to the issues of food and nutritional security, poverty alleviation, diversifying market demands, export opportunities, employment and environmental concerns is posing new challenges to the agriculture sector. It is expected that future agricultural growth would largely accrue from improvements in productivity of diversified farming systems with regional specialisation and sustainable management of natural resources, especially land and water. Effective linkages of production systems with agro-processing and other value addition activities including marketing as well as with employment would play an increasingly important role in the sustainability of agriculture. In particular, linkage of State Agricultural Universities (SAUs)- undertaking the activities of agricultural education, research and extension (TOT) with the industry- undertaking the activities of agro-processing, marketing, etc. would be richly rewarding in future mainly in terms of direction, strength, quality and sustainability of such linkages.

Absence of linkage of any sub-system with any other sub-system leads to isolation, which in turn, leads to low production (Sabarathnam, 2001). The isolated system also gets the criticism of not meeting the needs of the society. Linkage among various sub-systems is highly essential for enhanced efficiency of the system because every sub-system learns from and depends on every other sub-system within a system. Agriculture, and for that matter Indian agriculture, is no exception to this.

THE INTRA-SYSTEM LINKAGES :

Before aiming for inter-system linkages, the intra-system linkages must be ensured so as to have balanced growth. Intra-system (say in SAU), linkages mean linkages among education research-extension-farmer, which are essential for proper diagnosis of the problems and evolving location specific solutions to those problems.

Interface between farmers and scientists : The direct interface between scientists and farmers is the most ideal and should be undertaken wherever possible. It is an oft-repeated refrain that farmers learn best from scientists or other successful farmers. Moreover, transmission losses are minimized in the direct interface. However, there are relatively high costs attached to this direct mode of technology transfer and the outreach of scientists is limited. University of Agricultural Sciences, Dharwad and Punjab Agriculture University have achieved significant success through this system.

Activating Existing Interface Mechanisms : Regional Committees of the ICAR, Zonal interfaces initiated by DAC, national level pre-kharif and pre-rabi DAC-ICAR interface, state level bi-annual meetings between line departments and SAUs are all formally instituted mechanisms for improving research-extension linkages. Several of these mechanisms have fallen into disuse or are conducted in a perfunctory manner. As a result the desired results are not being achieved. These have to be activated and further strengthened.

Use of Information Technology (IT) : Information Technology revolution is unfolding, and has very high visibility. However, its benefits have remained confined primarily to the urban areas. Rural communities have not been able to gain to the same extent from IT. As a means of agricultural technology transfer to farmers, information technology, has had a limited impact. Even the vast potential of the broadcasting network has been tapped only minimally for extension. Harnessing Information Technology for agricultural extension should receive high priority. Extensive use of modern information technology should be promoted for communication between researchers, extension workers and their farmer clients to transfer technologies and information more cost effectively and time effectively. Information technology should be made available, particularly, to those with specific inquiries to guide them in adopting the more knowledge intensive forms of agriculture. However, application of IT is constrained by lack of or inadequacy of complementary inputs (equipment, power, etc), appropriate organisational and institutional structures, information management and skills development, which may be seriously looked into.

IT Application in Agricultural Marketing: Agriculture produce marketing requires connectivity between the market and exporters/ growers/ traders, industry consumers, through wide area network of national and international linkages in order to provide day-to-

day information with regard to commodity arrivals and prevailing prices, etc.; to provide links for online international market information; to provide export related documentation; to inform about the latest research outcomes in agricultural marketing, packaging, storage related information and to provide connectivity with lead international and national market organizations.

Private Information Kiosks : Promotion of private information shops/kiosks franchised out to private sector especially unemployed rural educated youth in the manner of PCOs/ STD shops would go a long way in communication development. Private sector should be encouraged to establish information shops at block/mandal/village level.

Privatisation of Agro-services : An environment in which private investment in technology generation and transfer is more attractive should be created. Product diversification both horizontal and vertical should be promoted not only to improve profitability, sustainability and more efficient use of production resources but also to encourage greater involvement of the private sector. Wherever opportunities exist to contract out publicly-funded services, or to transfer costs to the corporate sector or to users themselves, such opportunities should be exploited. Privatisation of selected agro-services wherever a competitive market exists, such as artificial insemination services, soil testing, fertilizer advice, farm improvement plans or breeding plans, may be undertaken. Wherever feasible, contract farming involving private sector should be taken up, particularly, in the case of high value/ export oriented agriculture. Such privatised agro-services may be offered at reasonable cost and not for free. Wherever farmers have the capacity to pay for public services, which are in the nature of private goods, realistic cost of such services should be recovered.

Expected Role of Government : Government may create an enabling environment through appropriate legislation, rules and regulations, and application of the rule of law. In particular, it implies that private contracts and property are protected and a judiciary exists to enforce contracts without partiality and undue delay. Where many individual small holders are concerned a legal course of action may, however, not be practical or politically expedient for handling conflicts and disputes. Government can instead support institutions like an independent arbiter, an ombudsman, or a small farmer reference service that would certify bonafide borrowers or agricultural producers. Governments can also set minimum standards and norms for commodities such as food, pesticides and packaging materials when it is in the interest of public health. To protect the weaker of the contracting parties, governments can propose minimum standard contract clauses and guidelines for small farmer/ agribusiness transactions. An important condition for lasting farmer-agribusiness linkages is security of tenure. Activities supported by international donors in many countries include land titling, formal transfer of public land to de facto users and outright land reform. The enhancement of competition could be another government contribution to improving the institutional environment. It involves all measures to ensure open, fair and transparent competition and to facilitate entry of newcomers. It may include breaking up of monopolies and cartels, ensuring minimum professional standards of business conduct, and resisting demands for non-technical obstacles to official licensing by rent-seeking lobbies. A lack of financial means is frequently the reason that prevents newcomers from establishing new businesses.

Governments can assist young entrepreneurs to access credit and venture capital by providing technical assistance to prepare business plans, conduct market surveys and hire help to resolve special engineering or legal problems and through this to improve confidence of funding sources in new ventures. Part of creating an enabling environment would also be to address the downside of privatisation and liberalization. This might include the provision of safety nets and skills for alternative livelihood to those who are unable to survive the competition in deregulated markets.

Strengthening Farmers' Associations: Government services can help identify existing associations or cooperatives of farmers and support them to develop their organization. The aim must be to assist the groups to define their objectives, such as savings mobilization or specific post-harvest operations, to ensure group coherence and continuity, and to assist them with setting up group structures and organization. Over time such groups can establish a track record of organizational maturity that will allow, possibly after joining with other groups for economies of scale, to engage in their own business activities and to gain access to formal credit. Government extension services and NGO staff need to receive suitable training to act as group facilitators. Training should be centred on group dynamics, record keeping and accountancy, financial management of savings and credit, identification of group business opportunities and producing business plans, and on imparting technical skills to undertake new ventures. Support to farmers' organizations is perhaps the main single input that governments can provide for the promotion of farmer integration with agribusiness.

Strengthening Physical Infrastructure : The government's role could increasingly be in the area of physical infrastructure provision, including communications and utilities, farm-to market roads, and rural and urban markets. Promotion of private sector could be through making available sites with road and electricity connections to attract enterprises that may set up marketing or processing facilities as part of an industrial estate. Rural or farm-to-market roads also facilitate linkages between farmers and private service providers.

Improving Information Base : Another way of levelling the playing field for private sector is the improvement of information. Information gathering and analysis is costly. Compared to commercial business, farmers are at a disadvantage on knowledge about prices, volumes, qualities, alternative marketing channels and other features governing market transactions. Government can improve the communications flow and the quality of information to farmers through training workshops and publications. Government can also sponsor market matching exercises, that is, sponsor meetings and workshops involving farmers and agribusiness enterprises to improve mutual understanding of constraints and requirements, and promote concrete business deals.

THE INTER-SYSTEM LINKAGES :

Research-Industry Linkages: It has been the experience in India and elsewhere that often the unit cost of production can be brought down by technological upgradation of the production processes; The lowering of unit cost will assist both the producers through improved incomes and the consumers through lower prices. This approach is not only critical from the point of view of improved incomes to farmers. As the country dismantles

the quantitative restrictions on imports of agricultural commodities it will be necessary that farmers be in a position to meet the threat of cheap imports through improved efficiency, higher productivity and lower costs (Rajan, 1997).

Research institutions whether in the domain of public services or private sector will have to backstop the agricultural development by offering technologies that can optimise yields and maximise farmers' incomes. All industrial units producing inputs and equipment required by agriculturists will have to forge a close linkage with the research institutions to facilitate the dissemination of technologies together with inputs, be they fertilizers, seeds/planting material, bio-fertilizers, pesticides or farm machinery along with marketing of their products. Industry associations have begun to play a part in the development process other than merely marketing of products, which would need to be intensified and made for more extensive.

There is also a change needed in the way we do research (Paroda, 1997). We have to move from "Project mode" to "Programme approach", which cuts across disciplines, commodities, divisions and institutions. This will require prioritisation of national and institutional programmes and strengthening of inter-disciplinary and inter-institutional linkages involving "Matrix Management System". Programme mode will also ensure teamwork culture, the most critical element for the growth of science, and will also establish the much-needed institutional linkages.

Industry-Farmer Linkages: Industrial units that process raw agricultural commodities into value added products will also find it advantageous to build a long term relationship with farmers who will meet their raw material requirements. This relationship will have to go beyond securing raw materials and extended to providing extension services and support of the flow of basic wherewithal to farmers to produce agricultural commodities of requisite specifications, in adequate quantities and for sustained and regular supply. There are examples of these linkages between research-industry-farmers. However, in the coming years as agriculture systems become highly commercialised, Indian agricultural commodity markets get integrated with the global markets, far more intensive and coordinated efforts will be needed to meet adequately the farmers' requirements and ensure that their socio-economic lot is enhanced.

Post-Harvest Handling and Value-Addition: This is a very promising avenue for income growth of small farmers, but the reality is that there is hardly any value addition at farm level (Jha, D., 2001). As high as 98 per cent of the fruits and vegetables are sold as fresh products, and processing accounts for only 7 per cent of agricultural value. Wastage levels are extremely high (Singh, Panjab, 2002). Public research in this area was confined to household level preservation. Currently several approaches are being explored. Biotechnology is opening opportunities for improving quality and shelf life. Processing technologies are being developed for rural and small-scale settings. But the dominant trend in this sector is import of technology, process and products, treating small-scale producers merely as supply agents for raw materials. These and claims for high-tech (or capital intensive) agriculture do not mesh well with capital starved small-scale farming. So far as R&D is concerned, a thrust on competitive rural and household processing and food sciences to offer cheaper, indigenous products, organic production, renewable energy options for cooling, food safety, markets, etc. would be essential to lend vigour to small-scale

agriculture. Thus, industry-SAU linkages need to be strengthened to promote agro-processing of and value addition to agricultural commodities to a greater extent.

Marketing : Marketing sector, being highly dynamic, has vast scope for linkages with SAUs. Market research including price forecasting/forewarning, demand-supply management, scientific storage, transportation and grading to meet export requirements, pesticide residue analysis, etc. is of great relevance for SAUs to have linkages with industry. An agency like Agri Export Trade Information Centre, as is being established at UAS, Dharwad if linked with industries, APMCs and farmers or farmers' organisations can serve a great cause of collecting, analysing and disseminating very valuable information to farmers and traders, thus leading to development of the marketing sector, in particular, and of the nation, in general.

The modalities proposed to operationalise the National Agricultural Policy as far as augmentation of marketing infrastructure is concerned are: (a) Expansion of storage capacity: Capital subsidy scheme for establishment modernization of storage/cold storage; (b) Promotion of direct marketing: Vertical integration between producers and consumers; (c) Development of rural markets: Creation of rural infrastructure for value addition; (d) Strengthening of marketing information system: About 500 district centres to be connected; (e) Review of existing laws and regulations to remove unnecessary controls and restrictions. In other words, the National Agricultural Policy lays heavy emphasis on creation of market infrastructure and information system. Hence, to have better linkages with other sub-systems, market infrastructure needs to be developed.

Contract Farming : The corporate sector, instead of buying the land of small and marginal farmers thereby converting them into landless labour, can promote contract farming (Swaminathan, 1997). This can be done in all crops, including medicinal plants, so that industry does not face difficulty in the sourcing of raw material. What is needed is contract and not corporate farming. There are many valuable examples of this kind in the country, as for example, tobacco and sugarcane. SAUs can facilitate contract farming through Krishi Melas, establishment of Agri-Export Trade Information Cell (as is being conceptualised in UAS, Dharwad), etc.

Similarly, following areas provide lot of scope for establishing and strengthening linkages between industry and SAUs:

- **Organic Farming** : SAUs can provide consultancy for undertaking commercial production and can provide market information. In turn, industry can provide feedback to SAUs.
- **Vermi-compost** : It is a saleable product. SAUs can produce vermi-compost on commercial scale. SAUs can also provide consultancy for undertaking commercial production and can provide market information. In turn, industry can provide feedback to SAUs.
- **Cotton** : Processing of cotton lint till finished garments could be under SAU-Industry joint effort. SAUs will provide research inputs to industry.
- **Export of Cut Flowers** : Trade in cut flowers represents an important item in international trade. The share of developing countries in the total global trade of cut flowers has been steadily increasing at a moderate rate. The share could increased at a faster rate through SAUs-Industry (Export Agency) linkages by way of improved production and marketing techniques as well as information on markets and contacts with importing countries.

- **Drip Irrigation** : For example, SAUs can have tie-up with industry like M/s.Jain Drips for developing irrigation infrastructure on farmers' fields.
- **Pulses** : Value addition.
- **Oi/cake** : Solvent extraction and export of oilcakes.
- **Aromatic and Medicinal Plants** : Contract farming, exports.

Conclusion :

While recognizing the impact of the Green Revolution in imparting dynamism to the agriculture sector, it must be recognized that the Green Revolution remained restricted to the well-endowed irrigated areas of the country. The success has been restricted to selected crops and agro-ecological situations. Even in this arena, a growing disparity between the actual and the potential yields points to a crucial gap between research and extension.

Linkage among various sub-systems is highly essential for enhanced efficiency of the system because every sub-system learns from and depends on every other sub-system within a system. Agriculture, and for that matter Indian agriculture, is no exception to this. Linkages of State Agricultural Universities (SAUs)- undertaking the activities of agricultural education, research and extension (TOT) with the industry- undertaking the activities of agro-processing, marketing, etc. would be richly rewarding in future mainly in terms of direction, strength, quality and sustainability of such linkages. The potential areas for having linkages between SAUs and industry are: Post-harvest handling and value-addition, marketing, contract farming, organic farming, vermi-compost production and marketing, cotton processing till finished garments, export of cut flowers, drip irrigation, value addition in pulses, solvent extraction and exports of oilcake, contract farming and export of medicinal and aromatic plant, among others.

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Agriclinics and Agribusiness Centres Scheme

M. Sudharshan Reddy¹ & M. Surya Mani²

¹Dean of Agriculture, ANGRAU, Hyderabad (A.P.)

²Assoc. Professor, Extension Educational Institute, Hyderabad (A.P.)

Today's agriculture sectors is facing serious challenges in the wake of WTO. Farmer has to depend on many people / media to realize quality inputs and services. The Government and private agencies are putting their efforts to meet these challenges. However, the same is not reaching most of the needy farmers. These issues if we examine critically, we can easily make out two aspects: One is Extension worker to farmer's ratio is very wide 1:1000 (time available for each extension worker to attend the farmer is very less). Other is Every year 11,900 Agriculture Graduates are coming out of Agricultural Universities - the job opportunities in private and public sectors are only 2000. Thus, a reservoir of technically trained agriculture graduates is waiting for the opportunities. To meet these challenges, there is need for strong agricultural extension services, not only to educate the farmers in latest technologies but also to provide required services.

A: Objectives :

Against this background, GO!, (Funding) through SFAC (Nodal agency), MANAGE (training, hand holding, M & E, documentation and Dissemination) and NABARD (refinancing) introduced, a new scheme of Agri-clinics and Agri-business centers. The main objectives of the scheme are

- (i) Supplementing the public extension,
- (ii) Providing multi sources and specialized extension services and
- (iii) Providing self-employment opportunities for un employed agriculture graduates.

B: About the programme :

Agri-clinics are those which 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 productivity of crops/animals.

Agribusiness Centres are those, which provide input supply, farm equipment on hire and other services.

C: Project Activities :

Participants are exposed to all possible agriventures by considering the local conditions. An indicative list of 20 ventures is given below which is not exhaustive. Hence, there is scope to add enterprises during the phase.

- Soil, water quality and input testing laboratory service center.
- Plant protection service center (pest surveillance, diagnostic and control services including integrated pest management).
- Maintenance, repairs and custom hiring of agricultural implements and machinery including micro-irrigation systems (sprinkler and drip).
- Agri service centers including at least the above three activities mentioned above (group activity).
- Seed processing units.
- Micro-propagation through plant tissue culture labs and hardening units.
- Setting up of vermiculture units, production of bio-fertilizers, bio-pesticides, bio-control agents.
- Setting up of apiaries (bee-keeping) and honey and bee products processing units.
- Provision of extension consultancy services.
- Facilitation and agency of agricultural insurance service.
- Hatcheries and production of fish finger-lings for aquaculture.
- Provision of livestock health cover, setting up of veterinary dispensaries and services including frozen semen banks and liquid Nitrogen supply.
- Setting up of vermiculture units, production of Bio-fertilizers, bio-pesticides, bio-control agents.
- Feed processing and testing units.
- Value addition centers.
- Setting up of cool chain from the farm level onwards (group activity)
- Post-Harvest management centers for sorting, grading standardization, storage and packing.
- Setting up of metallic / non-metallic storage structure and rural godowns.
- Retail marketing outlets for processed agri-products.
- Rural marketing dealerships and farm inputs and outputs projects in any other service oriented activities in agriculture and other areas. can also be considered.

MANAGE has established a network of 65 reputed training organization in the country to train the agripreneurs. Till now about 6895 (Source: MANAGE Report on "Progress of Agri clinics & Agri Business centres scheme from 1-4-2002 to 19-3-2005") unemployed graduates were trained and 1593 have established business units and agriclincs. In Andhra Pradesh five (5) Institutions were entrusted to train the unemployed agriculture graduates under Agriclincs and agribusiness centers schemes.

Those are Extension Education Institute (EEI), ANGRAU; Participatory Rural Development Initiatives Society (PRDIS), Nagarjuna Agricultural Research and Development Institute (NARDI). Confederation of Aquaculture Fisheries and Welfare Organization (CAFWO) and Centre for Entrepreneurship Development (CED).

D : Content of the training Programme :

To build up the capacity of agripreneurs, two (2) months training Programme is organized by different institutions. A Model training programme modules is as follows.

Training Modules :

a. Theory Sessions

- Background topics for Agri-clinics: (4 sessions)
- Project Management: (9 sessions)
- New Economic Policies and Regulatory / Development Framework: (6 sessions)
- Small Business Management: (6 sessions)
- Marketing Management: (10 sessions)
- Agri-Marketing Management: (10 sessions)
- Financial Management: (12 sessions)
- Communications Skills: (6 sessions)
- Information Technology: (12 sessions)
- Agricultural Extension and Entrepreneurial development: (9 sessions)
- Practical Issues: (8 sessions)
- General Sessions: (10 sessions)

b. Visits - Agri entrepreneurs and RD programme: (34 sessions)

c. Practical sessions on Post Harvest Management: (8 sessions)

d. Practical sessions on project planning and project preparation: (24 sessions)

e. Assignments and Library work: (12 sessions)

E : Handholding Facilities :

Under the Agri-clinics and Agri-Business Centres scheme, there is a provision to under take follow up in order to maintain regular contact and communication with the trained agripreneurs and also to help them to establish agri-clinic and Agri-business centers. As one of the training Institutions, PRDIS has taken up the following activities:

- Interactive meetings were organized with the trained agripreneurs to motivate them for establishing innovative enterprises.

- Established regular contact and communication through telephone and Internet to guide them in solving their problems.
- Visit to the sites where agripreneurs establish some of the enterprises to offer them on the spot advises. ~ Monitoring and rapport through regular correspondence.
- Undertaken Liasion work with Bankers, Goveniment and other organizations to facilitate the establishment of enterprises and their sustainability.

In order to make better use of the hand holding facility, the agripreneurs are advised to play a proactive role by forming net work among themselves, visiting each other, keeping in constant touch with the training institution and to make use of the windows of opportunities available at present.

F : Development in Andhra Pradesh :

The training organizations has given training to 427 (Source:- Report from MANAGE (1-4-2002 to 19-3-2005) agripreneures of which 118 participants were established their own business, consultancy centers such as production of organic vegetables, sericulture and consultancy, consultancy and hiring services of tractors and farm implements, vegetable seed production, floriculture, vermicompost units, rural market dealership, consultancy on pest management of important crops, medicinal and aromatic plant units, one stop shop for agriculture, poultry units and inputs shops etc.

The success rate was not up to the expectations the reasons identified are

Reasons for low success rate

- Non-cooperation of bankers.
- Non-serious candidature in training.
- Lack of motivation and not having feeling of partnership.
- Delayed hand holding support.
- Delayed training funds.

G : NABARD Initiatives to encourage Agripreneures :

- Margin money /collateral security upon loan of Rs. 5.0 lakhs has been waived off.
- Rate of interest on refinance in respect of loans provided by banks for agriclinics and agribusiness centers scheme will now be @ 5.5% irrespective of the size of the loan.
- The banks are requested to consider revising appropriately the rate of interest charged by them for units financed under the scheme.

- The margin money assistance would be available in cases where the loan amount exceeds Rs. 5.0 lakhs. Since the RBI has already waived margin money requirement for loans upto Rs. 5.00 lakhs.
- The service charges to be collected by banks for such loans is maximum of 2% p.a. instead of 5% p.a. stipulated earlier.
- The banks are requested to include first six months regular requirements (operating expenses) of the agriculture entrepreneurs. While considering the loan amount for agri clinics and agribusiness centers as capital expenditure.
- The banks are requested to consider financing internet kiosks either separately or in combination of any of the activities.
- Set up at least 10 agri clinics and agribusiness centres in each district.
- Nodal officer at regional office level to monitor effective implantation.

H : Some of the innovations for effective functioning :

- The syllabus is modified to as per the aspirations of the participants.
- Besides, each module was fine-tuned to include topics of interest and needs of participants, weightages for the topics were changed accordingly.
- Pre and Post evaluation of participants.
- More field visits to actual sites to learn about business management and to gain confidence in Business.
- The training programme was made more skill oriented rather than message oriented.
- Informal and In-house discussions with experts to motivate the participants to go for agribusiness.
- Given enough time and energy to discuss with them about the follow up action.
- Given them enough reference material and website details.
- Recap sessions were included.
- Interactions with Senior Bank Officials of Lead Banks.
- Presentation and discussion of projects individually and in groups with facilitation from experts.

I: Suggestions :

- Some mechanisms have to be evolved to see that the participants feel that they are partners of Agribusiness programme and the programme should be tailored as a demand driven one. One of the mechanisms suggested in this direction is to admit the candidates for the training after interviewing and counselling rather than admitting all the applicants without proper screening.

- The participants should be charged some money towards registration, so that the truly interested participants will join the training programme. This money can be used as deposit and can be refunded at the end of the program to the participants with satisfactory attendance.
- The programme could be organized in rural settings (or) exposure visits arranged to facilitate the participants expose to real farming life.
- Attachment with successful Agri-entrepreneurs for two weeks based on the projects identified by participants will help to learn the mechanism of business practically and also to gain confidence.
- Some incentives can be provided for outstanding participants.
- Facilitating network among the trained graduates from each training centre will help in accelerating the process of establishing the clinics / business
- One of the problems faced by the trained participants is delayed sanction of bank loan and normal interest rates. It is suggested that the Bankers may be persuaded through NABARD and GOI to assign priority to the agripreneurs and also to provide loans with reduced interest rates. This can accelerate the process of establishing Agri-business and Agri-clinic Centers by the trained participants.
- The subsidized inputs to farmers are presently being supplied through District Cooperative Market Society (OCMS) and MARKFED. A portion of such distribution may be allotted to the trained agripreneurs so that their clientele will be increased.
- The licenses for input dealerships may be issued exclusively to the trained agripreneurs.
- The nodal officers may be deputed to other centers to monitor the training activity, which will help in cross-fertilization of ideas.

Conclusion :

The agri clinics and agri-business scheme is adequately and timely funded and conducted dedicatedly with a motive that it can improve our national health and economy as well as prosperity of farming communities through sustainable environment approached in different fields of agriculture.

Private Extension Systems

S.S. Baghel

Vice-Chancellor, Assam Agricultural University, Jorhat, Assam

The Private Extension is defined as the process of funding and delivering the extension services by private individual/organization. So far, in India, agricultural extension has by and large remained public in nature, though private players are joining the process in a big way. The private players are funding and/or delivering extension services in many specialized areas like medicinal and aromatic crops, seeds, GM crops etc. They also provide information and market.

The need:

India marched ahead rapidly in agricultural sector during the second half of the 20th century with introduction of high yielding varieties, improved technologies in terms of fertilizers, irrigation, pesticides, field implements and massive organizational buildup and services through community development through national extension services and other ToT programs. During this period the total food grain production in India increased from a mere 51 MMT in 1950 to 200 MMT in 2000-01. This was almost four folds increase. The population has increased to around 1000 million from 350 million in 1950. To feed the increasing population in 2015, the demand for cereal alone is projected at 240 MMT. No doubt, it was the untiring effort of extension system in transfer of extension technologies, which helped in achieving this production.

Today's agricultural scenario has also changed completely with entry of large number of multinational companies, consultants and hi-tech technologies with change from production to processing, value addition and marketing. Farmers' organization and NGOs are supporting and serving the farmers under different climatic conditions for diverse crops. Added to this, the revolution in information technologies made it easier to farmers for access to information. Present commercial agriculture has made the farmers to look around for support in every need at the most crucial time technology, credit, inputs, information, machinery, markets and policy support. But the public extension system is not able to reach all the farmers at all the time for all the problems.

The major limitations of public extension system are

- Wide ratio between extension personnel and farmers. It is 1 : 1000. Out of the total extension personnel, 25% are engaged in administration. The rest extension personnel spent 50% of their working time in administrative and official works. Moreover, the public extension system is available to farmers for 250 days in a year, when national and paid holidays are taken into account. Under this system, it is not possible to attend individual farmers for their specific need for knowledge, technological and managerial skills and aspiration.

- The educational qualification of VLEWs, who are in direct contact of the farmers and whom they serve, is not in the line modern technological line. According to a report of the ICAR (1998), out of 1,10,000 such staffs only 20% were graduates. Even VLEWs with qualifications below metric are serving in many states. The agriculture is becoming hi-tech and they can't probably communicate with the poor farmers.
- In most state, the role of extension personnel is mostly confined to advisory services only. The responsibility to work for input supply, processing, value addition and marketing are very limited even in higher-level extension personnel.
- Specific choices/demands of farmers could not be fulfilled with in specified time and cost. The inherent weakness in research-extension linkage usually delays or sometimes altogether avoids delivery of technology chosen/demanded by farmers. Technologies not being adopted/used by farmers are more common in all the states.
- The Govt. funding of public extension system has been a decreasing trend and its support for other social needs are on the rise.
- Public extension service is not able compete with private organization in utilizing the recent advances in the field of agricultural information technology, which has made easy farmers' access to information.

National Policy on Agriculture and Private Extension :

The national policy aims to

- Realize the vast untapped potentials of the Indian agriculture.
- Strengthen the rural infrastructure to support agriculture development.
- Promote post harvest/processing activities of agricultural produce for value addition.
- Encourage and promote agribusiness.
- Create employment in rural sector.
- Improve the standard of living of farming communities, agricultural workers and their families.
- Discourage exodus of rural population to urban areas in search better livelihood.
- Propane our own agriculture to face the challenges arising out of economic liberalization and globalization.

In the efforts to achieve the same as above, the new agriculture policy made certain references to private extension as follows.

Strength and weakness of private extension :

Extension work is recognized usually as a public good. The public extension in Indian agriculture, since independence, has been solely responsible for increasing the agriculture

production, reduce rural poverty, increase quality of life and contribute to earning foreign exchange. But it has reached such a stage, where farmers require more individually tailored technology and support services that are of high quality and are willing to pay for it.

The public extension had its strength in India agriculture in its huge and strong network with qualified agri professionals, information support and skill sharing on diverse technological aspects. Its weakness lie in narrow focus of the system, lack of coordination amongst different ToT system, lack of farmer focus and feedback, poor technical capacity within the system to meet individual information needs, with research-extension-farmer-market linkages, delayed communication and inadequacy in resources for the system to operate efficiently.

The private extension shall focus on exact need of the farmers or on special clientele groups. Its strength further lies in better quality services specifically for high valued crops, quality irrigation farming situations, demand driven conditions, closeness to market and specific research-marketing linkage. At the same time, private extension is also not free from inadequacy in term of its limited and sectarian research for both farmers and crops, limited networks, over emphasis on information as an economic input, unethical advertising, publicity techniques and lack of emphasis on general compensatory issues other than the technology promoted by private extension machineries. There is the threat of beneficiaries further being marginalized particularly the resource poor farmers and the social development is relegated to the back stage.

Private Extension Service Provider (PEPS) :

Under the Indian context a large number of PEPS could be identified

- Unemployed and under employed agri-graduates and post graduates
- Para technicians, possessing the skill but without formal professional degree
- Individual agricultural consultants and consultancy firms
- Progressive farmers
- Farmers co-operatives, marketing societies, farmers interest groups and other farmers organizations
- NGOs/CDOs and SHGs
- Universities and Research Institutes
- KVKs managed by NGOs and other private organizations
- Agribusiness companies, Agri-clinics etc
- Input dealers
- Private sector banks/ credit institutes
- National and International donor agencies
- Corporate business organizations
- Media including news papers, magazines, private TV channel and Radios
- Internet

Status of Private Extension in the World :

Countries across the globe have made certain shifts in agricultural sector binding the extension functionaries to responsibilities. These alternative ways of financing agricultural extension services vary from cost sharing to cost recovery. The table 1 below provides information about the countries promoting private extension for agricultural development.

Table-1: Experiences with Private Extension across the globe

Country	Mode extension
New Zealand	Complete commercialization of public extension
Netherlands	Cost recovery from users
Germany	Complete, semi, subsidized privatization and voucher system
Denmark	Extension services rendered by farmers' organization
China	Contracting of SMSs by Farmers' groups
Ecuador	Share cropping between farmers and extension staffs for a profit
Costa Rica	Voucher system
Chile	Subcontracting and voucher system
Ethiopia	Privatized service center
Turkey	Cost sharing of advisors
Kenya	Extension associated with contract out of grower scheme
USA	Venture capitalist enter
U.K.	Promotes direct payment by users for extension services
Canada	Commodity groups fund and control their own agronomists
Norway	Government and farmers are on 50:50 cost sharing agreement

Major stakeholders in Private Extension :

In India, a large number of organizations have started participating in the growing investment and extension needs of agricultural development and thus influence the reform process of Indian agriculture. The major stakeholders and their configurations in which they participate are presented below in table 2.

Table 2: Major stakeholders in private extension service in India

Major stakeholders	Sub groups	Participation configuration	Examples
Private corporate firms	A) Input firms	Information support Sponsorship Cost sharing Training	Indo-American Hybrids, ASPEE, Sandoz.
	B) Consultancy firm	Project consultancy Technical consultancy Managerial consultancy	Agrotech, Good Earth, Green Valley Plantations
	C) Contracting firms	Main contracting Sub contracting	ITC CAICO
Farmers' association	Producers Consumers	Self Help groups Co-operatives	KHDP IFFCO RIBHCO
Non-Governmental organizations	Individual Charitable Professional	Self Help groups Neighborhood groups Organized services	Mitranikethan BAIF PRADAN
Media organizations	Print Electronic	Information support Sponsorship	Karshaka Sree, Asianet, Surya

Possible Private Extension approaches in India :

A number of systems can be forwarded for enhancing the role of private players in agricultural extension work. They are

- **Share cropping:** Extension officers share profit farmers
- **Extension contract system:** Agricultural consultants and consulting firms provide advice and input for production in return of shared value.
- **Village extension contract system:** The whole village can hire consultancy on payment basis
- **Contract farming:** Agribusiness firms provide advice and input for production and buy back the products.
- **Public extension through private delivery:** Private players get the production job, and Govt. and target clientele groups share the cost of private players.
- **Service for vouchers:** Farmers are given vouchers, which they can trade with Private Extension agencies.
- **Private Extension service provider:** They provide input, infrastructure, credit and market for money.

Objectives of Public Private Partnership (PPP) :

One of the most important tools for enhancing the role of private players in agricultural extension is public-private partnership, which is an arrangement between public sector and private sector to deliver services that have been traditionally being delivered by the Govt. departments. The basic objectives of PPP are

- Increased efficiency in service delivery.
- Reduction in fiscal budget
- Empowerment of farming community
- Optimum resource utilization

Strategy for achieving the objectives of PPP :

To achieve these objectives the followings ways can be undertaken

- Public fund and private management as reflected in case of support to NGOs, Farmers organization and contract services.
- Sharing fund by both public and private management as reflected in case of watershed management, micro-credit and matching grant to farmers interest groups
- Public facilitation and private funding as reflected in case of Agri-clinics, Agri-business, Info-shop and Para technicians
- Sharing fund and utilization facilities by both as reflected in case of private TV channels and Radios.
- Public infrastructure and private resources and management as in case of market yards, rural huts and leasing out of Govt. farm to private producers
- Partnership without financial involvement as in case of public-private interface, private participation in workshop, seminar and taskforce etc.

India is self-sufficient in food production, but the next issue of concern is nutritional security. With establishment of the WTO, the scenario of agricultural production and marketing is changed in terms availability of low-cost technology, hi-tech production mechanism, value addition, price competitiveness, market and marketing, and use of information technology. These in turn are putting additional responsibilities on the public extension but commitment can't remain unfulfilled if we are to move ahead and establish ourselves in the world agricultural scenario. Hence, the private extension in agriculture with understanding of its role, efficiency, policy implication, regulation, benefits to stakeholders, advantage and disadvantage, is to be encouraged for a true Rainbow Revolution.

Private Extension - Indian experiences :

Agri-business organization: Agrocel offers advice and services including arrangement of inputs for crop improvement, land and water management, nutrient management, pest and disease control. It was started with an initial investment of 6.00 lakh and has turned out to be a 374.00 lakh worth organization in 2000-01.

Private Extension through Agri-business companies - Agrocel experience :

Center Location	Starting year	Initial Investment (Rs. Lakh)	Sales in 2000-01 (Rs. Lakh)	Working Capitals (Rs. Lakh)
Kutch, Gujrat				
Koday	1998	6.00	233.56	20.00
Rapar	1990	1.00	60.35	10.00
Nani Khakar	1996	1.00	19.97	3.00
Mundra	1996	1.00	27.53	3.00
Kothara	2000	2.00	15.65	5.00
Kukma	2000	1.00	1.60	2.00
Nakhatrana	2000	1.00	5.02	1.50
Vadodara, Gujrat				
Bhoi	2000	1.50	7.62	1.67
Haryana				
Kaithal	2000	2.00	2.39	11.00

Farmers' organization: Various organizations like water users associations; watershed management, farmers' interest groups and other such organizations carry out agricultural extension through group formation, institutional development, resource mobilization and linkages. Successes in this venture are given below from Kerala and Assam.

Private Extension through Farmers' Organization- experiences :

Name of organization	Functions	Linkages
Sundar Pukhuri Milk Producers' Society, Assam	Awareness programme Advisory service Arrangement of inputs Providing milch cows Management service Buyback provision and marketing	State Department of Veterinary and Animal Husbandry, Assam Department of Dairy, Assam Zilla Parishad, Sivasagar, Assam
	Training	KVK, Nazira, Assam Agricultural University ONGC, Assam
Karshaka Munnetta Samitee-1	Organizing seminar and trainings Formation of SHGs Arbitration in case of labour issues	KVK NABARD Krishi Bhavan
Farmers Relief Forum	Organizing trainings on scientific agriculture Organization of seminar Mobilization of loan relief fund Legal issues Collective procurement of inputs Recreation	Dept of Agriculture Input agencies

Non Govt. Organization: Ramkrishna Mission Ashram, Ranchi carry out village extension and follow up programs for agricultural development in selected villages. The Field Management Committees in Assam are registered under state Dept. of Agriculture as private extension agencies.

Private Extension through Non Governmental Organization- experience :

Name of organization	Activities
Ramakrishna Mission Ashram, Ranchi	Promotion of FSR Group based activity Use of community volunteers in extension work Women and youth development
Field Management Committee in Assam	Advisory service Input arrangement Training Community volunteers in extension work Linkages with State Department of Agriculture, Assam

Consultancy: The grow more Agri-clinics in Bangalore started in 1995 with the aim of transfer of technology in agriculture and allied fields like garden development and maintenance, orchard and plantations, pest control for domestic purpose and hiring out garden plants etc. They are serving successfully individuals, Govt. offices, private farms, industrial areas, orchards and plantations and corporate buildings.

The Canara Bank started agri-consultancy in 1988 and the total earnings from consultancy services stood at 180.88 lakh in 1999-2000.

Gohain Agro-service Centre, Badulipar, Assam a agriculture professional of AAU under SFAC program is providing input and services in the Golaghat district of Assam.

Privatisation of Extension Services

M. Sudarshan Reddy¹ and R. Ratnakar²

¹Dean of Agriculture, ANGRAU Hyderabad, AP

²Associate Professor, Extension Education Institute, ANGRAU, Hyderabad, AP

The development of Agriculture and its sustainability mostly depends on the effectiveness of the Agriculture Extension, its approaches, services delivery, methodology and processes. The extension becomes most important link between small technology generating system and diverse, big client base. Over a time, farmers are changing in terms of their desires and demands. Agriculture system is changing from the subsistence to commercialization and policy focus in agriculture at the national and state level is faced with fresh challenges due to fluctuating monsoon and market. In this backdrop, questions have been asked about the relevance of present extension system and its delivery mechanism. The need of the hour is to work for reorientation of extension system to make it more need based, accountable and sustainable.

In the present day context of liberalization, privatization and globalization (LPG), several changes have been taking place in different sectors of daily life of people. Agriculture is one among those sectors, on which more than 60 per cent of the Indian population depends for their livelihood. It has been changing into various forms as per the people needs. Public agricultural extension system pressurized to modify its role according to the present day farming community needs. Hasanullah (1999) reported that the growing commercial and specialized nature of agriculture would demand quick and technically sound advice, based on scientific analysis with appropriate marketing information. Existing public extension system is not capable of meeting these challenges. So, there is the necessity of an alternative to public extension system, which can serve in a better way. In words of Bloome (1993) the privatized extension involves any personnel in the private sector delivering advisory services in the areas of agriculture and is viewed as an alternative to public extension system.

Extension worker to farmer ratio in Andhra Pradesh is 1:7880. If the administrative and supervisory officers are excluded from the extension personnel, traveling time of extension worker is deleted from extension time, the ratio further widens and extension worker time available for each farmer per season is negligible. Such a situation is created where technologies are available but transfer of technology is slow and inadequate. When there is little scope for extension department to expand, reaching the last farmer is possible only by networking. Therefore, private-public partnership in Agriculture extension Management is need of the hour. Promotion of Private Extension Service providers (PESP) is pre-requisite for promotion of private-public partnership.

Meaning of Privatisation :

According to Rivera (1998) privatization means a full transfer of ownership, usually by way of sale from government to private entity. However, the term is often broadly

conceived to induce efforts by countries to decentralize and / or fiscally redesign their extension systems. So, it means cost recovery for the service renders to the users.

Experiences across the globe:

Different countries across the globe have various types of private extension system to deliver advisory services

Country	Case
Newzealand	Complete commercialization of public extension
The Netherlands	Cost recovery from users
Germany	Complete, semi, subsidized privatization and voucher system
Denmark	Extension services rendered by farmers organisation
China	Contracting of SMSs by farmers groups
Equador	Share cropping between farmers and extension staff for profit.
Costa Rica	Voucher system
Chile	Subcontracting and voucher system
Ethiopia	Privatized service center
Turkey	Cost sharing of advisors
Kenya	Extension associated with contract out grower schemes

Factors to be considered in Indian context:

- Socio Economic strata differences among the farming community viz., tenancy, ownership, leased, small, marginal, medium and large farmers categories.
- Types of crops cultivated throughout the country
- Agro climatic variations around the country
- Various approaches to be fallowed in different developing and developed countries and their utility possibilities in our country, environment etc.
- Changes in rainfall pattern, vagaries of monsoon, floods, cyclones.

Important lessons out of International Experiences:

- Private extension reduces the economic burden of the governments-Netherlands
- Increases the efficiency of extension services provided up to the satisfaction of farmers. Otherwise replaced by other private extension service providers (PESP). Government has perfect control over private extension - Chile
- Personal economic interest of the extension agent mixed with his profession increases his involvement in extension activity - Share cropping in Equador
- Privatisation increases the accountability of extension agent -.extension contract system in China
- It is possible to prevent the farmers being exploited by private extension agents by proper legislation -Denmark

- Private extension is cost effective compared to public extension due to low overhead charges - United Kingdom
- Certification and grading of technical consultants is possible for regulation - Germany
- Government can focus on sustainable areas leaving regular extension to private extension - Tunisia

Various approaches :

There are several approaches to private extension services like;

- Share cropping system
- Extension Contract system
- Village extension contract system
- Contract farming
- Public extension through Private delivery Goint funding)
- Consultancy firms by agricultural graduates
- Agribusiness companies
- Farmers associations
- Private corporate firms
- Media organizations
- Non-Governmental Organisation -NGOs and Voluntary Agencies
- Producers Cooperatives
- Krishi Vigyan Kendras
- Agri Input dealers
- Internet, Donor agencies
- All India Radio, Television, Print medium (news papers, magazines.etc)
- Banks (NABARD, Regional Rural Banks, Commercial Banks, Scheduled Banks etc.)

Major Private Extension Providers in India :

ITC Ltd. (Soya-chaupals ,Aqua-chaupals),n Zuari fertilizers, Monsanto, Syngenta, Mahyco, Nathseeds, Proagro, CIBA-Geigy, Cynamid, RCF, HLL, Wochardt, VetIndia, VetPharma, Hoechst, Ranbaxy, TAPE, Messy&Fergusson, Hindustan Tractors, Mahindra& Mahindra, Nagarjuna Agrichem, M S S Research Foundation, and the NGOs etc.

These are a few experiences in Indian context :

Punjab - Farmers Association for Extension Services :

In Punjab the farmers associations are formed with an objective of providing seed production, multiplication and demonstration, extension education to farming communities. These associations acts as a forum for highlighting the problems of farming community by imparting them new technology and assistance in production, They also conduct international study programmes and spread awareness of new high yielding varieties of horticulture crops, It also provides for reclamation of land and organizing seminars and training camps.

Kerala-Group Approach to provide extension services to the farmers :

In Kerala there are around 60 farmers organizations of varying sizes and mandate operating in Calicut district providing extension services. These organizations are formed by the sole initiative of local village leaders without any direct involvement of formal or political leaders. All the groups are registered as per the cooperative societies act and function within the framework of by-laws. Some groups are smaller in size serving a single village while some are bigger with 300-400 members serving a cluster of villages. The bigger organizations are having a federated administrative structure with committees at district, panchayat and ward levels. The decision making power is vested with the central or executive committees which are answerable to the General body. The periodicity of core committee meetings varies from 1-2 months while that of GB is a year.

Electronic Knowledge Delivery to the poor by MSSRF :

M S Swaminathan Research Foundation (MSSRF), in an experiment in electronic knowledge delivery to the poor, connected ten villages near Pondicherry by a hybrid wired and wireless network consisting of PCs, telephones, VHF, duplex radio devices and email connectivity through dial up telephone lines. This facilitated both voice and data transfer, and enabled the villagers to get information that they need and can use to improve their lot. The entire project draws its sustenance from the holistic philosophy of Swaminathan, which emphasises an integrated pro poor, pro women, pro nature orientation to development and community ownership of technological tools against personal or family ownership and encourages collective action for spread of technology.

The bottom up exercise involves local volunteers to gather information, feed it into an intranet and provide access through nodes in different villages. Value addition to the raw information, use of the local language (Tamil) and multimedia and participation by local people right from the beginning are the noteworthy features of the project. Most of the operators and volunteers providing primary information are women, thus giving them status and influence. All centers evolved themselves to meet the information demands made by the community.

Participatory Rural Appraisal was carried out in all the hamlets prior to setting up these village knowledge centers. In each case community has identified and provided an accessible place and 2-4 volunteers. The community also provided quality space rent-free and agreed to compensate the volunteers whenever needed. The volunteers are young men and women chosen by the community. They manage the village center on a voluntary basis. The project pays no money to them. In turn, the project provides all the needed equipment, training and data. An MOU is signed to this effect and is renewed whenever necessary.

Although all knowledge centers perform the same function, viz. satisfying the information needs of the local community, they are not managed the same way. Different villages have evolved their own ways of managing the center. Some are located in public building, some in temples and in a private house.

The project has demonstrated that new ICTs can play a crucial role in this effort. Information provided in the village knowledge centers is locale specific and related to prices

of agricultural inputs (such as seeds, fertilizers, pesticides), and outputs (rice, vegetables), market (potential for exports), entitlement (the multitude of schemes of central and state governments, banks), health care (availability of doctors and paramedics in nearby hospitals, women diseases), cattle diseases, transport (road, conditions, cancellation of bus trips), weather (appropriate time for sowing, areas of abundant fish catch, wave height in the sea), etc. Unique to this project is the fact that most information is collected and fed in by the local community itself.

The unique and innovative model of MSSRF needs to be adopted on pilot basis in all the states of India for effective delivery of extension services with people's participation.

Agricultural Extension through Voluntary organizations :

The major objective of the scheme, launched in 1994-95, is to involve NGOs in agricultural extension with a view to integrating their efforts with those of the main extension system. The scheme is being implemented on a pilot basis in two districts each in six states: Bihar, West Bengal, Andhra Pradesh, Madhya Pradesh, Karnataka and Uttar Pradesh, and one district each in Manipur and Tripura. The scheme is funded by the Directorate of Extension, Ministry of Agriculture, on the basis of 100% assistance to NGOs through CAPART. A broad ceiling is fixed at Rs 5 lakhs per annum per district. The NGOs are being funded for documentation of farming systems at the micro level, audio-visual preparation and procurement, training and demonstrations, farmers visits to research stations, administrative support and contingencies.

Experience is encouraging, both in terms of physical targets and in integrating NGO efforts with those of the main extension system

The impact of the scheme clearly points to issues like:

- An increased awareness among farmers in the project area.
- Increased efforts in trying out new technologies.
- Greater involvement of farm women and farmers from weaker sections of the society.
- Improved linkages between NGO activities and research.
- Increased use of electronic media, print and films in field extension.
- Systematic approaches towards farmers training.

RAITHA MITRA YOJANE is the new demand driven agricultural extension system of the karnataka state. It has replaced the earlier t & v system of agricultural extension. The agricultural extension centres opened under this new programme at hobli level are called raitha samparka kendras (rsk).

Bring back professionally qualified agriculture graduates back to the villages: Agriliclinics and Agribusiness centres scheme.

Every year 11,900 agriculture graduates are coming out of Agriculture Universities out of which only 2000 getting job opportunities leaving 9900 unemployed. It is estimated that 50,000 60,000 such unemployed agriculture graduates are waiting for opportunities.

Government of India launched a scheme called Agriclincs and Agribusiness centres, implemented through Small Financial Agribusiness Consortium (SFAC), National institute of Agriculture extension management (MANAGE) and National Bank for Agriculture and Rural Development (NABARD). The scheme has three important objectives.

- To supplement the efforts of public extension
- To provide multi focused and specialised extension services and
- To provide self-employment opportunities to unemployed agriculture graduates in new emerging areas.

Under the scheme, unemployed agriculture graduates are trained in agribusiness aspects for two months at Government cost in their respective states. Graduates are exposed to potential agro ventures, market survey and bankable project preparation. One year post-training hand holding supported is provided to trainers in the field through respective training institutes. Trained graduates on eligible to take loan up to Rs.10 lakhs for individual project through any nationalised bank / RRB/Co-operative Bank.

MANAGE has trained more than 6000 candidates out of which 1282 have established agriclincs and agribusiness centres at national level. In Andhra Pradesh, Manage has trained 425 candidates out of whom 119 have established agriclincs and Agribusiness centres in different parts of the state under 36 categories of agribusiness activities

MYRADA - a partner in managing Rural Development programs :

MYRADA is a Non Governmental Organization managing rural development programmes in 3 States of South India and providing on-going support including deputations of staff to programmes in 6 other States. It also promotes the Self Help Affinity strategy in Cambodia, Myanmar and Bangladesh

MYRADA was started in 1968. Its history can be divided into two periods. From 1968 to 1978-79, MYRADA was involved entirely in the resettlement of Tibetan Refugees. From 1978-79 MYRADA has been involved with the rural poor in response to invitations from State Governments and people.

MYRADA is directly managing 16 projects in 12 backward districts of Karnataka, Andhra Pradesh and Tamilnadu. It is presently coordinating two operational networks of NGOs, one involved in arid zone regeneration in Andhra Pradesh and the second in the SUJALA - Karnataka Watershed Development Project. Other similar operational networks ended successfully in 2001. In other regions, where it is not directly operational, it is engaged on a long term basis in capacity building of other institutions involved in rural development; major examples of such long term support are in North East India (Manipur, Meghalaya and Tribal Districts of Assam), Haryana and Indonesia (IFAD supported projects), in Uttar Pradesh (World-Bank supported project), and in Myanmar (UNDP supported project). Experienced and qualified staff of MYRADA has been deputed on a long term basis to the Mewat Development Agency in Haryana, to the Rajiv Gandhi Rural Housing Corporation and the Women and Child Development Department in Karnataka.

MYRADA has initiated a District strategy in four Districts, through a network of NGOs and with the support of Regional Rural Banks (RRBs) and private institutions to foster livelihood strategies through the promotion of Self-Help Affinity Groups (SAGs), Watershed Management Programmes and technical support for off-farm livelihood sources. Some of these networks have also opted to foster strategies in preventive health.

MYRADA has emerged as a major training resource. On average 7000 training programmes are conducted annually, 90% for people from communities we are working with, and the rest for NGOs, Bankers and Government officials. The training programmes for the people, who are largely members of community based institutions, are generally conducted in the village while those for others are conducted in MYRADA's 11 well-equipped residential training centres called Centres for Institutional Development and Organizational reform (CIDORs), one Krishi Vigyan Kendra and several Sub-Centres.

MYRADA's organizational structure consists of a Board comprising eminent persons, an Executive Director, a Deputy Director and Programme Staff. Programme Management and financial systems are decentralized to the project level and below; personnel policies and the Mission Statement are common.

Implications of privatization :

- The motto of public extension is to educate, to guide and to co-operate with the people. It cannot be with the private sector. But, in case of privatization, it will have to be competitive in acquiring the resources necessary to fulfill its noble mission. When extension finds itself competing with the private sector in programming, it is probably doing the wrong thing.
- One of the important functions of extension is to facilitate transfer of information to the farmers and sharing of ideas with them. With privatization, extension personnel's interaction with farmers' restricted access to free flow of information with the agricultural knowledge system will be hampered. Thus, the scientists will be deprived of the farmers' valuable ideas and innovations.
- Introduction of private agricultural extension services on pilot basis in area will promote the activities and popularize benefits among the farming community.
- More funds should be allocated to the extension programmes so that as and when the new technique is developed, it should reach the farmers with in no time.
- Efforts are needed to increase the mobility of the extension workers by providing adequate transport facilities. They should be provided with more infrastructure facilities, essential teaching and communication equipment etc. A continuous policy and funding support from the respective agencies can increase the efficiency of the extension programmes.

- It is necessary to expose extension personnel engaged in training institutes to the modern training methodologies, electronic media, audio -visual aids, demonstrations materials etc. This is needed for preparing the trainers for 21 st century, which will be more complex and demanding than at present. This will increase their credibility in the process of technology transfer.
- Despite providing free of cost extension services, only 25 to 30 percent research technologies reach the farmers fields. What would be the fate of remaining 70 percent of technology if extension were privatized?
- Private agencies must concentrate their activities on areas having favorable physical environments. Such as fertile soil and satisfactory infrastructure. They are less interested in rain fed, resource poor and unfavorable areas where possibility of making profits is very difficult or virtually nil. More over, Private extension agencies don't usually apply their resources to he food crops fundamental to the farmers, but on the cash crops.
- Though the advice from a privatized system may be more effective because the farmer can select and adviser who is best able to help, privatization of extension services may hamper the free flow of information. (Van Den Ban and Hawkins, 1997)
- The commercial interests of these private agencies jeopardize the efforts by public research and extension system towards eco- friendly and sustainable agriculture
- The HRD role of organizing, motivating and grading farmers for empowerment will be sidelined
- Small and medium farmers, who don't have access to public extension services, will be eventually displaced from commercial production (UNDP ,1991)

Conclusion :

Public Private Partnership with effective linkage mechanisms will be able to reach the unreached, more efficiently. Convergence is the need of the hour.

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