

Executive Summary

Under the auspices of the Agricultural Innovation Partnership (AIP), a three-week study focusing on Implementing Reformed Curriculum in Emerging Areas of Agriculture and Rural Development at Sardar Vallabhbhai Patel University of Agriculture and Technology (SVPUA&T), Meerut, India, was organized at Cornell University, Ithaca, NY, USA, in collaboration with Cornell University, University of Georgia and Tuskegee University. Team members agreed on the following guiding principles:

- Review the existing course curricula and enhance it with relevant courses in soft skills, gender and socio-economic issues and experiential learning
- Introduce new degree, diploma, certificate and vocational courses to meet the emerging needs of domestic and international markets
- Seek short-term deliverables, which should be possible only after one year, but build toward long-term goals
- Connect with private sector in all relevant courses
- Generate employable graduates to meet both domestic and global needs
- Build strong collaborations among SVPUA&T, Meerut and other AIP partners in India and the US
- Encourage rural business development to minimize rural migration to urban areas

The members reviewed the report of the fourth Deans' Committee and the curricula in SVPUA&T, Cornell, Georgia, Tuskegee and Community colleges in the US in the areas of Agriculture, Biotechnology, Food Science, and Animal Science and reached the following consensus:

- Agriculture education in India should sensitize students to emerging needs
- Greater opportunities for increased income for India's rural masses are needed
- An e-learning expert from Cornell University will visit SVPUA&T to work with the faculty and establish an e-learning centre. This centre will further coordinate with the relevant faculty to prepare e-learning modules.

The members discussed the curricula needs and deficiencies in each of the four areas, viz., Agriculture, Biotechnology, Food Science, and Animal Science, and developed recommendations for course curriculum and implementation at SVPUA&T as a pilot program and for subsequent use as a model for revamping curricula in other State Agricultural and Central Universities such as BHU and others.

Members recommended a total of 24 curricula to result in four Bachelor degrees, two of which are new and two revised; eight new diploma programs; three vocational courses in the area of food science and technology and one in the area of floriculture; and eight new certificate courses in the areas of agriculture, biotechnology, food science and technology, and animal science. Out of the 24 courses, 22 are self-supporting. The remaining two (B. Sc. Agriculture and B. Tech. Biotechnology) are existing programs; however, the experiential learning component of the programs will initially receive support from AIP.

A. Agriculture Sciences

1. The reformed curriculum for the Bachelor's degree in Agriculture introduces new courses in the area of natural resource conservation, bio-energy and climate change. The six new courses are:

- a. Water Management, GIS, Remote Sensing and Modeling
- b. Issues in Renewable and Sustainable Bio-fuels/Bio-energy
- c. The Climate System
- d. Climate Resilient Agriculture
- e. Nanotechnology Applications in Agriculture
- f. Gender Issues and the Role of Women in Agriculture

Relevant support courses in the areas of soft skills, experiential learning focusing on the rural sector, and gender and socio-economic issues have also been added.

2. To make experiential learning more extensive and educational, it is proposed to restructure the Rural Agricultural Work Experience program with two new innovative experiential learning programs, namely (1) Student Applied on Farm Agricultural Research (SAFAR) Program, and (2) Student Market Applied Research Team (SMART).
3. To sensitize rural youth, diploma courses in the emerging areas of entrepreneurship, marketing, and employment are planned. Seed technology and business, floriculture, horticulture technology and agri-business management were identified as focus areas for diploma courses. Diploma courses proposed for implementing at SVPUA&T are as follows:
 - a. Diploma in Floriculture
 - b. Diploma in Horticulture Technology
 - c. Diploma in Agribusiness Management
 - d. Diploma in Seed Technology and Business
 - e. Post-graduate Diploma in Food and Agribusiness Management
4. It was felt that for rural youth who are unable to continue their higher studies and want to become small-scale entrepreneurs, certificate courses for three months' duration or vocational courses of two to three weeks can help them get essential expertise to start their own micro-enterprises or gain employment in the growing organic and flower industries. The following certificate courses are proposed for such youth:
 - a. Certificate in Organic Farming
 - b. Floral Design Certificate
 - c. Vocational course for Florists

B. Biotechnology

The existing course curriculum of B. Tech. Biotechnology program of SVPUA&T was reviewed and it was recognized that there were duplications in the course contents of different subjects. Emphasis was made on incorporating soft skills, gender and socioeconomic issues, e-learning, entrepreneurship development, and experiential learning in the course curricula.

1. In the reformed curriculum for B. Tech. Biotechnology, new innovative experiential learning programs, namely (i) Student Applied Biotechnology Experience in Industry (SABEI) and (ii) Student Market Applied Research Team (SMART) have been introduced for implementation as pilot programs at SVPUA&T that can be replicated in other State Agriculture Universities offering B. Tech. Biotechnology Program.

2. Bioscience internship is yet another experiential learning program incorporated in the restructured curricula
3. Courses on critical thinking/ethics, soft skills, computer competence, and entrepreneurship development and gender and societal issues are now included.
4. To provide better opportunity for enterprising youth, a diploma program on 'Biotechnology Laboratory Technician' is proposed for implementation at SVPUA&T as a pilot program.
5. For rural youth who are unable to continue their higher studies and want to become a small entrepreneur, certificate courses for three months duration will help them acquire essential expertise. The proposed certificate courses are:
 - a. Certificate in Tissue Culture
 - b. Certificate in Diagnostic Techniques

C. Food Science

A new degree program in Food Science and Technology will bring the best in the world. Graduates from this program will exceed international standards in Food Science Technology and Education. The program provides contemporary knowledge, analytical skills, entrepreneurship and experiential learning to fulfill the requirements of stakeholders in research, academic institutions, private sectors, and NGOs. The revised curriculum includes:

1. Inclusion of some important supporting courses, viz., calculus, physics, chemistry, mathematics, statistics, English writing and oral skills, business management, etc., which were lacking in the ICAR curriculum.
2. Module for hands-on-training and experiential learning depending upon local needs and industrial demand in all possible areas of food science and technology.
3. Emphasis on skill development to face challenges of WTO. The revised curriculum will bring all-round development in the students with a focus on problem solving skills, critical thinking skills, leadership skills, gender issues, written and oral communication skills, international awareness, etc. Other new programs include:
 - Diploma in Food Processing
 - Vocational courses:
 - a. Bakery technology
 - b. Fruit and vegetable processing
 - c. Safe and hygienic practices for sweetmeat makers and street food vendors

D. Animal Science

A new undergraduate degree program B. Sc. Animal Science is proposed to produce animal scientists to solve the complex problems of animal enterprise management, and to apply their knowledge and skills in the growing animal science sector. Main features of the program include:

1. The new curriculum includes Basic Courses, Background Courses, General Courses including soft skills, Core Courses, Rural Animal Agriculture Work Experience, Industry/Research Internships, and Experiential Learning Modules in Cattle Production, Small Ruminants Production, Poultry Production, Aquaculture, Milk Processing, Meat Processing and Hygiene, Animal Biotechnology, and Animal-business Management.

Other new programs include:

- Diploma Course for Para-vets
- Certificate in Goat Production
- Certificate in Dairy Production
- Certificate in Fish Production and Management
- Certificate Program in Milk Production and Quality Control

Summary Table on Reformed Curriculum in Emerging Areas of Agriculture and Rural Development			
S. No.	Degree/Diploma/Vocational/Certificate	Old or New	Career Opportunities
Agriculture			
1	Revised B.Sc. Ag. Curriculum	Old revised	Rural Banks, Extension Agents, Crop Consultants, Dealers for seed, pesticides and Fertilizers, Private sector, Agriculture Development Officers and Private entrepreneurs
2	Diploma in Horticulture Technology	New	Nurseries, garden centers, greenhouses, orchards, gardens, and governmental agencies, certified plant professional and licensed pesticide applicators
3	Diploma in Floriculture	New	Farm/estate managers, Plantation Experts and supervisors, Project Coordinators, Teachers, Researchers, marketing agents, consultants, landscape architects and entrepreneur
4	Diploma in Seed Technology and Business	New	Seed industry, Seed Analyst, Production Coordinator, Seed Conditioning, Sales Manager, and Marketing
5	Diploma In Agribusiness Management	New	Junior Positions as Agribusiness Owner/Manager, Agriculture/Horticultural Contractor, Nursery Manager, Self-employment in the Rural Sector, Agriculture/Horticulture education, Horticultural Merchandising, Orchard Manager/Supervisor, Agricultural research, Field representative (stock firm, seed, fertilizer)
6	Post-graduate Diploma in Food and Agribusiness Management	New	Mid to Senior positions as Agribusiness Owner/Manager, Agriculture/Horticultural Contractor, Nursery Manager, Self-employment in the Rural Sector, Agriculture/Horticulture education, Horticultural Merchandising, Orchard Manager/Supervisor, Agricultural Research, Field Representative (stock firm, seed, fertilizer)
7	Certificate in Organic Farming	New	Organic production manager, organic enterprise manager, rural property manager. Junior Management position in Organic Agribusinesses. Private Sector Agribusiness Organizations, Organic/Quality Management Organizations, government Supported Projects and to set up Agribusiness Enterprises
8	Floral Design Certificate	New	Floral Designer, Design Assistant, Floral Shop Salesperson, Floral Buyer, Florist Manager, Entrepreneur, Shop Owner, Wedding Floral Consultant, Display Artist
9	Vocational course for Florists	New	Entry level positions in the flower industry

College of Biotechnology			
10	Revised B. Tech. Biotech Program	Old revised	Entry level positions in Life Science sector
11	Biotechnology Laboratory Technician Diploma	New	Clinical laboratory technician, Biological supplies manufacturer, Environmental technician, Food safety technician, Biomedical laboratory technician
12	Certificate course in Tissue Culture	New	Plant propagation, plant nurseries, germplasm centers in private and public sector
13	Certificate course in Diagnostic Techniques	New	
Animal Science			
14	B.Sc. Animal Science	New	Entry level positions in Veterinary and Dairy sector
15	Diploma Course for Para-vets	New	Veterinary clinic, animal hospital, production unit, or research facility, self-employment, clinical laboratories, education institutes, zoos, government departments, research & extension organizations & the biomedical industry, drug and feed companies and military
16	Certificate in Goat Production	New	Entry level positions in goat breeding, private entrepreneurs
17	Certificate in Dairy Production	New	Entry level positions in dairy, private entrepreneurs
18	Certificate in Fish Production and Management	New	Entry level positions in fisheries, private entrepreneurs
19	Certificate program in Milk Production and Quality Control	New	Entry level positions in processing units, private entrepreneurs
Food Science and Technology			
20	B.Sc. (Food Science and Technology)	New	Food industry, educational institutions, research and development, regulatory agencies, self-employment
21	Diploma in Food Processing	New	Food industry, self-employment, food inspectors, lab technicians, sales and marketing
22	Vocational course in Bakery technology	New	Bakeries, self-employment, bakery inspectors, lab technicians, sales and marketing
23	Vocational course in Fruit and Vegetable Processing	New	Fruit and vegetable processing industry, self-employment, sales and marketing, educational institutions
24	Vocational course in Safe and Hygienic Practices for Sweets Makers and Street Food Vendors		Hygienic and safe food production facilities, self-employment, hotel, restaurant and catering