



Can Tho University  
Biotechnology Research and Development Institute



# DEVELOPMENT PLAN FROM 2012 - 2017 TOWARDS 2020

2013

CAN THO UNIVERSITY  
**Biotechnology Research and  
Development Institute**

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**SOCIALIST REPUBLIC OF VIET NAM**  
**Independence - Freedom - Happiness**

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*Can Tho, March 20, 2013*

No.: \_\_\_\_/CNSH

**REPORT**  
**ON DEVELOPMENT PLAN FROM 2012 - 2017 TOWARDS 2020**

Pursuant to guidance of Party Commission and Can Tho University Administrator board and based upon Direction No. **1601** ĐHCT-KHTH, September 27, 2012 of university on building development plan for the period from 2012 to 2017 towards 2020; based upon current situation, opportunities and developing potential, Biotechnology Research and Development Institute has built the developing plan of the Institute. This plan has been reviewed and approved by Institute committee and Institute Commission level. We now would like to present the report to the University for reviewing (*The report is attached below*)

Sincerely,

**P.P INSTITUTE COMITEE**

**DIRECTOR**

***Recipients:***

- Party, Administrator Board;
- Store record

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# I. ACTUAL STATE

## 1. Institute actual state

### 1.1. Training activity – Quality assessment

1.1.1 Undergraduate (majors, number of students, job opportunities after graduation...)

Administrating and training majors including Biotechnology, Advanced Biotechnology and Microbiology, full time, beginning from course 32 (2006-2007) and now managing 738 students

- Current number of students is 553 students including Advance program course 34 (43 students), course 35 (87 students), course 36 (127 students), course 37 (142 students), course 38 (154 students).

- The number of graduated students 2012-2013 is 104 students.



**Figure 1 Graduation Ceremony for the first batch of the Advanced Biotechnology Program**

The Institute supervised 70 graduation theses which are evaluated as excellent level (A point) in academic year 2011-2012 (including Advance Biotechnology Course 33 and Biotechnology Course 34).

Students with good, excellent results in academic year 2011-2013 increased comparing to academic year 2010-2011: students with excellent results and excellent in the whole course: 2 students; student with excellent results academic year 2011-2012: 1 student; students with excellent and good results with good, excellent Extra curriculum grade: 32 students.

All students graduated with good rank and above, among these, very good and excellent results account for more than 87%. This reflects that students are getting used to credit system; facilities supporting for students have relatively met the requirements. Lecturers have applied proper teaching method to motivate student to discover, expand knowledge, develop individual skills, and update information to catch up with the development of economy and society in the area and all over the world.

1.1.2. Graduate program (majors, number of students, job opportunities after graduation...)

#### a. Training Master of Biotechnology

From 1997 till now, the Institute has trained 416 master students: course 16: 52 students (2009-2011), course 17: 30 students (2010-2012), course 18: 37 students (2011-



2013), course 19: 51 students (2012-2014), course 20: 46 students (2013-2015). Course 18 is now carrying out graduation thesis and will defend in August, 2013. Course 19 is now completing all the credits and will defend in October, 2013. Course 20 (2013-2015) have just admitted 46 students from 105 candidates.



**Figure 2 Thesis defend of the first batch of Master course**

The number of students applying to Master Program of the Institute is increasing more and more. From the very first year, the number of students ranged from 11 to 16 students per course. In 2005 (course 12) the number of graduate students increased to 27 students; 2006 (course 13): 31 students; 2007 (course 14): 51 students applied, admitted: 51 students; 2008 (course 15): 41 students applied, admitted: 41 students; 2009 (course 16): 54 students applied, admitted: 54 students; 2010 (course 17) students applied, admitted: 32 students; 2011 (course 18): 78 students applied, admitted: 41 students; 2012 (course 19): 82 students applied, admitted: 51 students and 2013 (course 20): 105 students applied, admitted: 46 students.



**Figure 3 Graduation Ceremony for graduate students in 2006**

Faculty members as well as staff members all fulfill the job in guaranteeing enough teaching time, practical credits, being discipline in evaluating activities, improving the program and updating syllabus and lectures.

#### **b. Training Doctor of Microbiology**

From 1982 till now, the Institute has trained 7 PhD with three having graduated in 1990s and four having graduated recently (from 2005) including Nguyen Thi Ngoc Truc

(course 2007, defended on 12/12/2011), Bui The Vinh (2009, defended on 6/23/2012), Ngo Thanh Phong (course 2008, defended on 9/03/2012) and Tran Thanh Phong (course 2006, defended on 6/30/2012). Recently, Tran Van Chieu (course 2005) has successfully defended graduation thesis on 3/14/2013 and Tran Thanh Truc (course 2008) will defend in early May, 2013. At the present time, there are 22 Ph.D students studying Doctor of Microbiology Program and one student (course 2013) is waiting for the result of admission.

### **c. Training Doctor of Biotechnology**

Doctor of Biotechnology Program was accepted by Ministry of Education and Training on 09/17/2012. Six students is now waiting for admission result (stage 1, 2013)

### **d. Cooperation in supervising PhD students**

Institute faculty members cooperate in supervising one PhD student from College of Agriculture & Applied Biology, 2 students from College of Natural Sciences, 1 student from College of Aquaculture & Fisheries and 1 student from Can Tho University of Medicine and Pharmacy.

#### 1.1.3. Syllabuses and materials

Food Microbiology syllabus

Author: Dr. Ngo Thi Phuong Dung; M.S. Huynh Xuan Phong

Environmental Microbiology syllabus

Author: Assoc. Dr. Nguyen Huu Hiep; Assoc. Dr. Cao Ngoc Diep

General Microbiology syllabus

Author: Assoc. Dr. Cao Ngoc Diep; Assoc. Dr. Nguyen Huu Hiep

Bioinformatics syllabus

Author: Dr. Tran Nhan Dung; Nguyen Vu Linh

Mycology syllabus

Author: Assoc. Dr. Cao Ngoc Diep; Dr. Nguyen Van Thanh

Biomolecular Practical Handbook

Chief author: Dr. Tran Nhan Dung

Monograph – Endophytic bacteria (2th edition with supplements)

Author: Assoc. Dr. Cao Ngoc Diep

#### 1.1.4. Quality evaluation activities

The Institute self evaluated following the AUN standard in 2010 and 2013

## **1.2. Scientific research and technology transfer activities**

### 1.2.1. Research projects

#### **a. At national level**

- “Study on genetic diversity of bacteria in the Mekong Delta and selection of bacteria producing bioflocculants, transforming nitrogen and phosphorus, applied in waste water treatment”, chief investigator: Assoc. Prof. Dr. Cao Ngoc Diep, budget: 2.65 billion VND

- “Technology transfer on biofertilizer for highland rural areas”, chief investigator: Assoc. Prof. Dr. Cao Ngoc Diep, cooperated with Bao Long Company, budget: approx. 3 billion VND.

#### **b. At ministry level: 3 projects**

(1) “Isolation and selection of denitrifying bacteria for waste water treatment”, chief investigator: Assoc. Prof. Dr. Cao Ngoc Diep, budget: 600 million VND; (2) “Preservation

and storage of plant hopper resistant rice strains”, chief investigator: Assoc. Prof. Dr. Tran Nhan Dung, budget: 150 million VND per year (for 5 years); (3) “Isolation of antagonistic bacteria to *Xanthomonas oryzae* pv. *oryzae* to prevent leaf blight pathogen in rice in Mekong Delta”, chief investigator: Dr. Nguyen Dac Khoa, budget: 585 million VND (for 2 years from 2013 to 2014).

In early 2013, the Institute has submitted three research proposals to MOET for review and selection to carry out from 2014 if approved.

#### **c. At local government level: 6 projects**

(1) “Organic waste treatments”, chief investigator: Assoc. Prof. Dr. Cao Ngoc Diep, cooperated with Tan Long Company, budget: 500 million VND; (2) “Genetic diversity of mangosteen and durian in Binh Duong”, chief investigator: Assoc. Prof. Dr. Tran Nhan Dung, cooperated with Southern Horticultural Research Institute, budget: 250 million VND from a total of 1.5 billion VND; (3) “Antibody in enteric septicemia of striped catfish”, chief investigator: Dr. Duong Thi Huong Giang, budget: 1 billion VND. This project was completed and is being for technology transfer with a budget of 3 billion VND; (4) “Biotechnology in Dong Thap Province”, chief investigator: Assoc. Prof. Dr. Tran Nhan Dung, budget: 500 million VND; (5) “Biodegradation of cattle hair by microorganisms in Can Tho city”, chief investigator: Dr. Bui Thi Minh Dieu, budget: 500 million VND; (6) “Application of biotechnology in selection of original fragrant rice suitable for cultivation conditions in Dong Thap province”, chief investigator: Assoc. Prof. Dr. Truong Trong Ngon, budget: 500 million VND.

#### **d. At university level**

- In 2012, the Institute was approved to carry out 8 research projects with a total budget approx. 350 million VND. All of these projects were successfully completed as plan with good results.

- In early 2013, the Institute was approved to carry out 6 research projects with a total budget was approx. 295 million VND. At the present time, the Institute is in progress to submit proposals for a year of 2014 as configured by CTU.

#### **e. Scientific research for students**

This is one of the strongest points of the Institute. The numbers of students learning in laboratory and working in research projects are increasingly more and more, leading the experienced skill and quality in research implementation made by students are also highly improved. In 2012, ten research projects implemented by students were successfully completed as plan with good results. Besides, among eleven “Vietnamese Young Science Talent awards 2012” prizes awarded to the university by the Ministry of Education and Training, the Institute had 5/7 prizes achieved by students (2 got 3<sup>rd</sup> place and 3 got consolation prize) and 1/4 prize achieved by faculty (consolation prize).

At present time, seven research projects (applied 2/2012) have been approved by the university for implementation from 2013. In April 2013, the Institute also evaluated and submitted 9 research projects proposed by students to the university’s review and selection for new coming stage.

## **2. International collaborative research projects**

- Basic research project of Nafosted “Study on the rice-root association mechanism of *Pseudomonas stutzeri*”, chief investigator: Assoc. Prof. Dr. Nguyen Huu Hiep, budget: 1.4 billion VND for two years.

- RIP VLIR/CTU (cooperated with Belgium): "Study on rice breeding for brown plant hopper resistance", chief investigator: Assoc. Prof. Dr. Tran Nhan Dung, budget: 2.8



billion VND for 4 years.

- Project funded by Ministry of Science and Technology, cooperated with Yamaguchi University: “Research collaboration on genetic diversity and application of useful thermo-tolerant microorganisms towards for industrial fermentation technology”, chief investigator: Assoc. Prof. Dr. Ngo Thi Phuong Dung, budget: 2.3 billion VND for 3 years (3/2014-2/2017).

- Other international collaborative projects: Asian Core Program 2008-2013 (cooperated with Japan, Thailand, Laos) on useful thermo-tolerant microorganisms in fermentation technology; MACBETH project (cooperated with Michigan State University, USA) on “Market Access through Competency Based Education and Training in Horticulture”; Establishment and development of society for Microbiology (cooperated with American Society for Microbiology, USA); MSFR 19 Biotransformation of straw and applications of biofertilizer for sustainable rice production (Embassy of Sweden); Collection of soybean species in Middle and Southern Vietnam, cooperated with USA.

## 2.2. Technology transfer activities

Over the past few years, some projects were successfully completed and applied:

- Phosphate solubilizing biofertilizers- dual inoculation biofertilizers for high productivity rice, hybrid maize, sugar cane, pineapple... are successfully produced in pilot scale to gradually replace chemical fertilizers employed in Dong Thap, Long An and Tien Giang provinces. This model can be expanded to other provinces.



**Figure 4 Workshop in technology transfer in Mekong Delta**

- Biofertilizer for soybean, peanut production process will be transferred for Dong Thap Technology Application Center, Tra Vinh Agricultural Extension Center. Moreover, this biofertilizer can be produced for soybean, peanut planting area in South-east Vietnam.

- Initial testing and providing defined alcoholic starters to local producers of rice wine making as well as supporting the quality examinations of final products and improving distillation method to obtain quality of products reaching the requirement of food safety.

## 2.3. Science and technology information

- Scientific activities of the Institute are maintained and developed either inside or outside of country. In recent years, many faculty members have had working missions and conferences in a country and abroad (Ha Noi, Ho Chi Minh City, Dong Thap province,

Thailand, USA, Japan, Laos...).

-The Institute cooperated with Asian Core Program committee to organize International Scientific Conference (2 days) on “Microbial Fermentation Technology”

- The Institute participated and presented at “The Final Joint Seminar of Asia Core Program 2008-2013” conference at Yamaguchi University, Japan on “Capacity Building and Development of Microbial Potential and Fermentation Technology towards New Era” with 5 articles in which faculty members of the Institute were either author or co-author with Japan, Thailand and Laos scientists.

- The Institute participated and presented at the 11<sup>th</sup> Japan-Vietnam Conference on “The 11<sup>th</sup> Vietnam - Japan Joint Seminar on Collaboration in Advanced Sciences and Technology” on 2<sup>nd</sup> and 3<sup>rd</sup>, March, 2013 at University of Science, Ho Chi Minh. There were 3 articles presented at the Conference, especially of which, there were 2 articles made and presented by students of Advanced Biotechnology Program.

- The Institute participated and presented at the 5<sup>th</sup> International Conference on Fermentation Technology for Value Added Agricultural Products in Khon Kaen, Thailand in 2013. There were a total of 9 articles presented at the Conference (5 oral and 3 poster), especially of which, there were 6 articles made and presented by students of Advanced Biotechnology Program.



**Figure 5 Mr. Nguyen Van Tinh (student of the Advanced program in Biotechnology) presenting at Khon Kaen, Thailand**



**Figure 6 Lecturers and students of the Advanced program in Biotechnology attending Conference at Khon Kaen, Thailand**



**Figure 7 Lecturers and students of the Advanced program in Biotechnology attending Asian Conference in Phan Thiet**

- The Institute cooperated with Environmental project in Tra Noc industrial zone (AKIZ- Integrated Wastewater Treatment Concept for Industrial Zones), which is a collaboration between Germany Government and Vietnam Ministry of Science and Technology, organizing a conference “Joint Seminar AKIZ Project - BiRDI on Waste Water Treatment Technologies” in April, 2013.

- Planning to organize Conference at the Institute by the end of 2013: “Biotechnology conference at the Mekong Delta 2013”. and publishing Proceedings of full scientific research articles contributed to the Conference.



- Planning to organize ASM Conference at the Institute and at other universities and institutes in Vietnam (Hanoi Agriculture University, Nha Trang University, Ho Chi Minh City Technology University, Ho Chi Minh City University of Science, Dong Thap University, Medicine-Pharmacy Can Tho University, Can Tho Technical-Economic College): “A series of ASM Society and Virtual Workshop on Scientific Writing and Publishing in regional Vietnam”.

- The Institute continues to support facilities as well as conducts biomolecular, microbiology technique for faculty members from other departments and off-campus organizations to research or doing experiments.

- The Institute continues to provide defined starters and support techniques for traditional fermented beverages and products in local producers in regional areas.

- In 2011 and 2012, the Institute had following publications: 4 text books and reference books, 7 articles published in international journals, 25 articles published in University journal and domestic science journals, 8 articles published in international Proceedings.

- In the first four months of 2013, 5 articles have been published (one article published in American Journal of Microbiological Research, USA) and 12 articles have been accepted and in press.

### **1.3. Building the organization, faculty and staff member apparatus**

#### **3.1. Organization and management activities**

##### **Board of directors**

One director for general management; one vice director for permanent management in production and finance; 01 vice director for research and international collaboration

The Institute Committee contains 7 members: Director, Deputy directors, cell's secretary, head of department, Union representative, Feminine group, Youth Union.

##### **Departments:**

Head of Department, Deputy Head of Department, Group leader

##### **1) Microbial Biotechnology department**

- Food Microbial Biotechnology Group

Food Microbial Biotechnology (Industrial microbiology), Food-biochemistry laboratory; 2 computer lab (36 m<sup>2</sup>)

- Microbiology group

Environmental Microbiology, Microbial Biotechnology laboratory

##### **2) Molecular Biotechnology Department**

- Biomolecular Group

Biomolecular, Protein-Enzyme, Bioinformatics laboratory

- Plant Genetics Group

Plant Genetics laboratory

##### **Office**

Office manager, office vice-manager; assistants in charge of undergraduate program, graduate program, scientific research, student activity, equipment; office secretary, department secretary, computer technician, accountant, cashier

##### **Union**

Labor Union

Youth Union

## **Production and technology transferring unit**

Accountant and cashier (concurrently)

### 3.2. Faculty member activities

The number of employees of the Institute is now 48 persons including regular staff or long-term contractors who are paid by the university, 22 faculty members including 4 associate professors, 6 doctors, 17 masters (9 is now PhD students), 9 bachelors (one is studying master degree) and other levels.

About enhancing academic level, 20/22 faculty members have graduate degrees (90.9%) including 10 doctors (44.5%)

The institute is now recommending to the University two technicians of Microbiology Department and Biomolecular Department to be regular staffs.

### 3.3. Training and foster cadres

- Cadres are studying at home and abroad.

Continuing to enhance level for faculty members: 01 cadre is study PhD sandwich program of Can Tho University and university of Belgium; 02 cadres is study full-time PhD program in Belgium; 01 cadre is carrying out PhD thesis in Canada; 01 cadre is carrying out PhD thesis in France; 01 cadre transferred from College of Agriculture is carrying out PhD thesis in Japan; 02 cadres is carrying out PhD thesis in Vietnam; 03 cadres study master program at home and abroad, two successfully defended thesis of Biotechnology master program. In the past academic year, the Institute dispatched many cadres to have short-term and long-term training program at home or abroad such as Belgium, France, Australia, Japan, Thailand, and USA ...



**Figure 8 Graduation Ceremony for Dr. Nguyen Van Thanh in Australia**

- Standardizing faculty and staff members

+ Standardizing specialists and main specialists: 02 specialists are studying specialist standardizing class and one is studying main specialist standardizing class

+ Training English for faculty members: 04 cadres were dispatched to be trained, two completed and two is still studying

+Standardizing and enhancing political level: in 2012, a cadre completed and took an advance political theory degree. Two is studying and will complete in the end of 2013



## 1.4. International collaboration and project management

### 4.1. Visiting delegation

- Last year, the Institute received 20 turns of international guests coming to visit, lecture for advanced biotechnology program, discuss for collaboration opportunity as well as organize conferences, seminars; among these, there were outstanding delegations coming from USA (MSU, LabCap/ASM); Denmark (Copenhagen University); Japan (Kyoto Institute Technology, Yamaguchi University, Hiroshima University), Malaysia (UPM), Thailand (Khon Kaen Uni., Kasetsart Uni.); Laos (National University); Belgium (Ghent University, Leeuven University, Biotechnology and Biomolecular Institute, Brussels).

### 4.2. Implementation progress of memorandum of understanding and collaboration letter

The Institute joined memorandum of understanding of Michigan State University and Can Tho University of Medicine and Pharmacy, Cuu Long Delta Rice Research Institute and South Eastern Fruit Research Center.

### 4.3. On-going programs and projects

Last year, the Institute continued to carry out international projects: Asian Core Program (cooperate with Japan, Thailand, Laos); RIP project, study on rice breeding for brown plant hopper resistance (cooperate with Belgium); Nafosted, Develop nitrogen fixing microorganisms and environment treatment; Collection of soybean species in Middle and Southern Vietnam (cooperate with USA); Food safety project (cooperate with American Society for Microbiology, USA)....

Besides, the Institute cooperated with College of Agriculture & Applied Biology to carry out MACBETH project (cooperate with Michigan State University, USA) on “Market Access through Competency Based Education and Training in Horticulture”.

The Institute continues to take advantage of opportunity to cooperate with Michigan State University (USA) for training Advanced Biotechnology Program.



**Figure 9 A typical lecture with professor from Michigan University for the Advanced Biotechnology Program**

## 1.5. Facilities and equipment

### 5.1. Workshop, laboratory

In total 4.543,2 m<sup>2</sup> usable area including laboratories, classrooms, conference rooms, hall and office, the Institute saved 1.326,8 m<sup>2</sup> to establish 8 laboratories including

Biomolecular Lab, Plant Genetics Lab, Protein Enzyme Lab, Informatics Lab, Microbial Biotechnology Lab, Food Biotechnology Lab, Environment Microbiology Lab, Food biochemistry Lab. The institute has two computer rooms (36 m<sup>2</sup>).



**Figure 10 Old building of the Biotechnology Research and Development Institute**



**Figure 11 New building of the Biotechnology Research and Development Institute**

## 5.2. Machines, equipments

Machines and equipments serve for education and scientific research. The Institute was provided 100 billion VND from enhancing capacity project and collaboration project on technology transferring and education, EC Europe, MHO Holland, VLIR Belgium to equip these following machine: Automatic DNA sequencing machine, Gel-doc 2000 system, UV-Vis spectrophotometer, PCR machine, Real-time PCR, Oligonucleotide Synthesizers, Partec Ploidy Analyser, Instrument for measuring fruit respiration, Biosafety Cabinet, Shaking Incubator, Grain Moisture Tester, DNA microarray reader & spotter , Dry Oven, Anaerobic Incubator, 50 liter fermenter, Food Analyzer, Fiber Analyzer, Colorimeter, Texture Analyzer, Biolog Microbial Identification, Bioreactor, Continuous Centrifuge, Fluorescence Microcopy and Phase Contrast Microcopy, Microscopy and micromanipulation, Molecular Imager VersaDoc, SDS-PAGE, 2D gel electrophoresis, Protein Analyzer, Streamline Chromatography System, Gel Dryer, Dryer-Pulverizer, Kjeldahl distillation system, Autoclave, Water distiller ...

## 1.6. Financial Resource –Tertiary production

-Pure water products enter the market. The number of bottle water sold in 2012 was 16.090 2l bottles; 22.819 330 ml bottles; 19.066 500ml bottles; Income: 339.001.500

VND; tax: 12.000.000 VND; profit: 40.788.243 VND.

## **2. Analysis of broadcast information, development tendency of society, development strategy of the government and the university relating to professional aspect of the institute**

The Government enforced the resolution 18/CP, 11<sup>th</sup> April, 1994 on developing Biotechnology to 2010. The resolution insisted on the viewpoint of the Party and the Government on developing Biotechnology. Developing Biotechnology is to optimally exploit, conserve and develop national biological resource as well as develop sustainable forestry-fishery, protect human health and living environment. Decision no. 11/2006/QD-Ttg of the Prime Minister on 12<sup>th</sup> January, 2006 validated “Program to focus on developing and applying Biotechnology in agriculture and rural development to 2020” and Decision no. 14/2007/QD-Ttg of the Prime Minister 25<sup>th</sup> January, 2007 validated “Scheme of Developing and applying Biotechnology on agro-industry to 2020”. Decision no. 14/2008/QD-Ttg of the Prime Minister 22<sup>th</sup> January, 2008 validated “Plan of general development and application of Biotechnology in Vietnam to 2020”.

Decision no. 1033/QD-TTg of the Prime Minister 30<sup>th</sup> June, 2011 on “Develop training-education and vocational education in Mekong Delta period from 2011-2015” clearly mentioned on undergraduate education, concentrating on enhancing training human high standard human resources; until 2015, average 190 students per ten thousand citizens to ensure appropriate structure of economic and social business which are advantageous of the region and provide sufficient human resource for local area. At the conference to implement this Decision in Can Tho, 9<sup>th</sup> October, 2011, Vice Minister of the Ministry of Training and Education Bui Van Ga claimed that Mekong Delta had to concentrate on investing facilities, improving school network; improving teacher resource, updating teaching content and method and evaluation, self-assessment; building, supplementing, adjusting policy specialized for the area; financial mobilizing. Especially, it was a priority to invest and develop Can Tho University to reach the level of universities of neighboring countries; building Can Tho City become a training human resource center for the area.

Biotechnology is one of four national priority high-technology fields of the Government (*Information technology, Biotechnology, Material Technology, Automatic Technology*).

Can Tho University built development strategy for the whole university in which priority in developing high-technology fields. Among these, Biotechnology is top priority. Biotechnology Research and Development Institute (Birdi) is the unit in charge of training human resource and developing this field.

Biotechnology Research and Development Institute is established from 1995 (Decision no. 2960/GD&DT 26<sup>th</sup> August, 1995). In developing process, the Institute has carried out a lot of international collaboration projects such as VH24&MHO7 (Holland), CTU/VLIR (Belgium), CTU/ MSU (USA), ACIAR (Australia), CTU/Putra (Malaysia), INRA, CIRAD (France), VN/Italia... Total expenditure of these projects is about 1 million USD. The Institute also carries out national, Ministry level, province level projects with current expenditure 5.5 billion VND.

The institute has been invested a lot of modern facilities with projects to enhance research capacity by Can Tho University and Ministry of education and training: Microbiology Laboratory (3.5 billion VND; 2002-2004), agro-fishery-forestry Biotechnology (7 billion VND; 2005-2006), Biotechnology application (33 billion VND; 2006-2008).

Biotechnology is a totally new concept appearing in the beginning of 20<sup>th</sup> century and quickly develops in the end of 20<sup>th</sup> century and the beginning of 21<sup>st</sup> century. Agricultural

Biotechnology, Medical Biotechnology, Environmental Biotechnology, Industrial Biotechnology increasingly play an important role in developing economy of nations all around the world. Biotechnology helps solve problems of environmental pollution, treat organic waste by biogas technology, treat waste water by microorganisms. In the field of medical and health, Biotechnology is an effective tool in diagnosis, prevention and treatment of human diseases. Study on producing protein-milk from gene transmitted cow help enhance immunization, prevent and treat many kind of human disease; produce vaccine. In-vitro fertilization offer hopes for many infertility couples. At the time being, there are ten thousands of baby born thanks to this technique. Thanks to applications of culturing animal cells and gene transfer technique, in vitro somatic hybridization, scientists can produce biopharmaceuticals such as vaccine, monoclonal antibody, blood agents, and blood clotting agents, cancer resistant, pesticide... used to prevent and treat disease in industrial scale and provide for the market with the annual income reaching billions of US dollar. In addition, scientists also studies on the use of microorganism to treat gut diseases, production of antibiotics, probiotic helping restore natural microbial system of digestion tube. Biotechnology was also applied to produce insulin, interferon and growth hormone [“Biotechnology Program in Can Tho, 2012].

Biotechnology Research and Development Institute has fulfilled the duty to train human resources and develop Biotechnology. On the other hand, other Colleges of the University such as College of Agriculture & Applied Biology, College of Aquaculture & Fisheries, School of Education, College of Natural Sciences, College of Environment & Natural Resource also have developments in Biotechnology field in their own professional aspects. The University Administrator expects the Institute to be leading unit in cooperating scientists between Colleges to promote potential of Biotechnology so that Biotechnology training and research can keep pace with other universities of neighboring nations.

Besides, Medical Biotechnology is a potential field which is still not properly exploit. Therefore, the University have sign MOU to cooperate with Can Tho University of Medicine and Pharmacy on 9<sup>th</sup> April, 2013 to facilitate the development of Medical Biotechnology. It is necessary to develop training, researching and applying Biotechnology in medical field.

## **II. ANALYSIS OF WEAK AND STRONG POINTS OF THE INSTITUTE**

### **1. Strong points**

In accordance of Direction No. 50-CT/TW, the Government asserted on investing modern facilities to develop Biotechnology, defining main product as well as training high quality human resource in scientific field.

Faculty members with deep academic knowledge and good English level are conscientious in training and scientific research activity. Scientific research sponsored by international organization, the Ministry and provinces and international collaboration is a strong point of the Institute

The Institute is in charge of training Biotechnology undergraduate and graduate program, Advanced Biotechnology Program, Microbiology program. The students which are admitted are from abundant sources with high quality. Research activities closely link with training activities.

### **2. Weak points**

Organizing and administrative activities of the Institute are not professional.

Administrative employees and technicians are not professional. Productions still meet difficulties. Although laboratories are invested, they are still modest and do not meet the standards. Class rooms are old and deteriorate.

### **3. Opportunities**

Biotechnology is a priority scientific major of the world generally and Vietnam specifically. Nowadays, exchanging and collaboration in training and scientific research with neighboring nations and developed countries are necessary to create opportunities to access and update information and technology for developing and applying Biotechnology in Vietnam. The Party and Government of Vietnam have had specific policy to develop Biotechnology to 2020. This is a very good chance for the Institute to develop human resource, upgrade infrastructure and facilities serving for training mission, scientific research and technology transferring.

### **4. Challenges**

The important point for employees of the Institute is able to recognize development tendency of Biotechnology around the world and current situation of Vietnam to identify suitable orientations and long-term objectives for the Institute as well as has a specific plan to develop the Institute in the near future. One of current challenges is to keep up with high technology of the major and training students with quality meeting AUN and international standards

## **III. INDEX INDICATING PROGRESS OF THE PLAN**

### **1. The number of admitted undergraduate and graduate students (size)**

Undergraduate: 220 students/ year

Graduate: 60 master students/ year; 6 PhD students/ year

### **2. The number of undergraduate and graduate programs**

**Undergraduate program:** 2 Biotechnology programs (Biotechnology and Advanced Biotechnology Program) and Microbiology annually admit about 130 students. Biological Technique, a new program, admits 60 students per year.

### **Graduate program**

Master of Biotechnology program: 60 students/year

Doctor of Microbiology program: 2 students/year

### **3. The percentage of faculty members having graduate degree**

In enhancing academic level of faculty members, there are 20/22 lecturers achieving graduate degree (90.91%) including 10 PhD (45.54%).

### **4. The number of annual scientific research projects**

a. National project: 2 projects, 1.88 billion VND/ year

b. Ministry project: 3 projects ~ 700 million VND/year

c. Local cooperating project: 5 projects ~ 1 billion VND /year

d. University project carried out by Institute faculty members: 8 projects, 350 million VND/ year

e. Student scientific research project: 10 projects/ year, ~ 200 million VND /year.

f. Foreign cooperating project: 6 projects ~ 900 million VND/year

### **5. The percentage of faculty member participating in scientific research per year**

One hundred per cent of faculty member participating in scientific research (21/21)

### **6. The number of technology transferred projects**



Six projects were transferred: (1) Phosphate multi inoculation biofertilizers for high productivity rice strains (Dong Thap) (2) Biofertilizer for soybean, peanut (Đong Thap, Tra Vinh) (3) Diagnosis kit for white spot disease on shrimp (Kien Giang), (4) Diagnosis kit for citrus vein phloem degradation (Ben Tre, Dong Thap), (5) Detect rice fragrant gene by molecular markers (Soc Trang), (6) Drying cocoa by solar energy technique (Ben Tre, Buon Me Thuot), (7) Liquor production technique (Tra Vinh)

**7. The number of international partners**

18 foreign partners

**8. The total income besides university budget**

~ 8 billion VND for scientific research/ year

## **IV. ACTIVITY PLAN FOR PERIOD FROM 2012-2017 DEVELOPMENT STRATEGY TO 2020**

### **General objective:**

The Institute continues to carry out Instruction No. 33/2006/CT-TTg of the Prime Minister on prevention of cheating and achievement "disease" in education and campaigns "Say no to cheating and achievement "disease" in education", "Say no to unqualified and not meeting social requirements training."

### **Vision of the Institute**

In 2020, Biotechnology Research and Development Institute will become an excellent research and technology transfer center and training high-qualified students majoring Biotechnology and Microbiology for Mekong Delta region. The Institute has advantages in human resources, excellent, enthusiastic lecturers with good academic knowledge and advanced management methods.

### **Mission of the Institute**

Mission of Biotechnology Research and Development Institute:

1. Training high qualified human resources specializing in Biotechnology in order to meet society's requirements
2. Scientific researching and technology transferring to have the optimal solution for practical biotechnology problems in Mekong Delta
3. Becoming a connection between the University and other research center in Mekong Delta to have cooperation in Biotechnology which facilitates assessments to advanced technology among each other and from around the world.

Priority fields for activities relating to Biotechnology from now to 2015 assigned by the university will be carried out by the Institute and other College which concentrates in training and research Biotechnology. These activities are i) Application of Biotechnology to selection, breeding and propagate plants, animal and microorganism with high productivity and quality to develop agriculture, fishery; production of biofertilizer,... ii) Application of Biotechnology to plant, animal disease control; iii) Preservation, development of biodiversity, management and exploitation and protection of natural resources in Mekong Delta coping with climate change; iv) Application of Biotechnology in food safety, preserve and process agricultural product and post harvest technology in Mekong Delta. Orientations from 2015, the Institute will participate in training and researching in Medical Biotechnology, application in stem cells and pharmaceuticals.

## **1. Training activities- Quality testing**

### **1.1 Development strategy of the Institute from 2017-2020**

Can Tho University has general strategy for developing the whole University in which developing high technology major, especially Biotechnology is the first priority. Biotechnology Research and Development Institute is responsible for training and developing this major. The Institute trains Biotechnology students follow AUN (Asian University Network) standard in which students are using fluently English and self-financing from 2015. The Institute focuses on self-evaluation training programs, especially Advanced Biotechnology program. In the first stage, it is primary to follow the general strategy of the University.

Priority fields relating to Biotechnology from now to 2017-2020 will be carried out by the Institute cooperating with other training and research centers as following:

#### **Training activities:**

Training Biotechnology Bachelor according to AUN (Asian University Network) standard in which students are using fluently English and self-financing

Focusing on self-evaluation training programs, especially Advanced Biotechnology program

In the first stage, primarily following the general strategy of the University

Continuing to improve the quality of the programs and expand the training program scale

Adjusting the Bachelor and Master programs

Adding courses such as human and animal physiology to support for stem cell researches and other biomedicine disciplines.

Preparing human resources and facilities necessary for teaching Advanced Biotechnology program, from 2015, being able to self-finance for Bachelor and Master Biotechnology program

Opening new majors: Biological techniques Bachelor, Master of Microbiology, developing majors which are being taught in Vietnamese to English (Advanced or International).

### 1.2. a Undergraduate (majors, the number of students,... by years)

No	Major	2013	2014	2015	2016	2017	2018	2019	2020
1	Biotechnology/ Advanced Biotechnology	160(40)	160(40)	160(30)	160(30)	160(30)	160(30)	160(30)	160(30)
2	Microbiology	60	60	60	60	60	60	60	60
3	<i>Biological Engineering</i>		60	60	60	60	60	60	60

### 1.2.b Graduate (majors, the number of students,... by years)

No.	Majors	2013	2014	2015	2016	2017	2018	2019	2020
1	Master of Biotechnology	60	60	60	60	60	60	60	60
2	<i>Master of Advanced Biotechnology</i>			-	15	15	15	15	15
3	<i>Master of Microbiology</i>			-	60	60	60	60	60
4	<i>Master of Advanced Microbiology</i>						15	15	15
5	Doctor of Biotechnology	10	5	5	5	5	5	5	5
6	Doctor of Microbiology	2	3	4	4	5	5	5	5
7	<i>International Doctor of Biotechnology</i>							2	2
8	<i>International Doctor of Microbiology</i>							2	2

### 1.3 Syllabus and materials

Until 2015, all syllabuses will be completed

### 1.4. Quality Testing Activities

Quality evaluation of all majors according to AUN standard

### 1.5. Solutions

Training: The Institute improves quality of current majors and expands the training program scale as well as organizes conferences on adjustment of the Bachelor and Master programs. Courses such as human and animal physiology are added to support for stem

cell researches and other biomedicine disciplines.

The Institute prepares human resources and facilities necessary for teaching Advanced Biotechnology program, from 2015, being able to self-finance for Bachelor and Master Biotechnology program.

From 2020, the Institute is keep pace with other universities of ASEAN countries.

Opening new majors:

- Biological techniques Bachelor (2014)

- Master of Microbiology (2015)

## **2. Scientific research and technology transfer activities**

### **2.1. Development orientations**

The Institute continues to maintain and expand research collaboration with local area; takes advantage of opportunities to carry out national projects, Protocol, Bilateral cooperation, international projects following orientations stated in general objectives.

### **2.2. Scientific research projects**

a. National project: 1 projects, 3 billion VND/ year

b. Ministry project: 3 projects ~ 700 million VND/year

c. Local cooperating project: 5 projects ~ 1 billion VND /year

d. University project carried out by Institute faculty members: 8 projects, 350 million VND/ year

e. Student scientific research project: 10 projects/ year, ~ 200 million VND /year.

f. Foreign cooperating project: 6 projects ~ 900 million VND/year

### **2.3. Technology transfer activities**

The Institute cooperates with Technology transfer service center to transfer beer production technology for a private company.

Producing bottled fruit juices for Mekong Delta and exporting to Laos and Cambodia

Continuing to transfer biofertilizer products

Continuing to transfer products through the program “Capacity enhancement in Biotechnology transfer program”

Training farmer culture technique for new rice strains, growing method of edible fungus, plant and animal disease prevention technique through the program “Capacity enhancement in Biotechnology transfer program”

### **2.4. Science and technology information activities**

The Institute encourages faculty members to write reference books, syllabus, and scientific articles for publications in international and national journal as well as participate and present in scientific conferences in order to contribute to the quality and scientific prestigious of the University.

### **2.5. Solutions**

In 2013, the institute maintains both quantity and quality in registration and operation research projects, continues to carry on Province projects.

Promoting scientific research and technology transfer activities, guaranteeing quality and progress of research projects, cooperation projects, technology transfer and agricultural extension program; promoting academic activities; encouraging and supporting young faculty members to be mainly responsible or to engage in research

projects

- Selecting plant and animal varieties with high quality suitable for Mekong Delta region like high quality brown plant hopper resistant rice strain, seedless orange, pomelo, Citrus Vein Phloem Degeneration resistant citrus species; generate indigenous fish such as Vo dem, Bong Lau, Leo, Chach, Nau, Keo, Doi fish; Study on genetic diversity of Phu Quoc dog,.. Apply stem cell technology to control animal fertility ability, store sperm, in vitro fertilization, embryonic transfer, preserve biodiversity

- Studying and producing biopharmaceuticals for agriculture, fishery and environment such as biofertilizer suitable for soil and plants in Mekong Delta, bio plant protection products replacing chemical based products, biopharmaceuticals for treating waste specific for the local, biopharmaceuticals for treating waste water in cat fish cultivation near Mekong river, treating environment in shrimp cultivation near the sea in Mekong Delta; Creating KIT to diagnose plant and animal disease; create vaccine treating white spot disease in shrimp; create enzymes, protein for analysis and human life

- Microbiology in medicine: study on endotrophic microorganism in medical plants having antibacterial ability to develop antibiotics originating from plants or microorganisms replacing for resisted antibiotics

- Study and conservation of valuable gene sources in the region and effective utilization of these sources for developing plant and animal adapting to Mekong Delta conditions

- Application of biotechnology in food safety, conservation and procession of agricultural products and post-harvest technology in Mekong Delta. Collection, isolation, storage and production of microorganisms with high activity utilized as a stable source, non-toxic for quality improvement of traditional fermentation productions, application in producing probiotics in breeding, fishery; Study on production of biofuel by microalgae, environmental treatment by benzene, toluene resistant bacteria.

- Systematically organizing training class on high technique for farmer, transfer technology to help raise the level of farmers. Training how to recognize disease symptoms on plants and fish such as: recognizing clinical symptom of rice yellow leaf disease, Enteric Septicemia of Striped Catfish...; prevention and treatment of insects causing diseases, utilization of environment-friendly natural enemy and biopharmaceuticals. Transferring popular method, technique in fungus cultivation, produce algae to increase income for farmers

### **3. Building the organization, faculty and staff member apparatus**

#### **3.1 Development orientations**

The Institute enhances faculty members training and fostering activities; continues to foster on professional knowledge, English so that they are able to study graduate program to follow develop faculty and staff member apparatus plan of the Institute to 2020.

#### **3.2. Organization and management activities**

Strengthen organization and management capacity, especially on faculty members as following orientations

- Building develop model for the Institute in new situation of organizational structure to carry out develop strategy to 2017 and 2020.

- Building development plan for teaching faculty members to 2017 and 2020 in order to raise quality and quantity of members

- The Institute gives much attention to enhance faculty ability, priority to training graduate level abroad. The Institute builds and develops cadre which is having good skill and increases the quantity as well as the quality of teaching faculty members, strengthen



solidarity to achieve development objectives of the Institute. It is important to train and foster scientific faculty members and management faculty members to guarantee the continuous development of the Cell and the Institute. Besides, the Institute also fosters female faculty members and Union cadres. The Institute encourages and supports faculty members to study to raise professional level, English, skills to satisfy requirements of the Institute and the University.

- The Institute has rewards and punishments in time, properly and strictly. The Institute strictly carries out instructions, resolution of the Party and policy of the Government on organization faculty member activities.

- On the other hand, paying attention to student management activities (including graduate and undergraduate students) by utilize software to manage current students as well as graduated students (alumni) in order to know their current information which supports the Institute in cooperate with local for transferring technology to locals, feedbacks on if students meets labor force requirement for self evaluation of the program

### 3.3. Faculty members development activities

HUMAN RESOURCES	2013	2014	2015	2016	2017	2018	2019	2020
Professor		1	2	<b>02</b>	03	04	05	<b>05</b>
Associate Professor	<b>04</b>	5	6	<b>07</b>	06	06	07	<b>08</b>
Doctor	<b>6</b>	10	12	<b>13</b>	17	20	22	<b>25</b>
Master	<b>17</b>	14	12	<b>17</b>	18	25	25	<b>27</b>
Bachelor	<b>9</b>	10	10	<b>6</b>	07	07	08	<b>09</b>
Others	<b>12</b>	11	11	<b>11</b>	11	11	11	<b>11</b>
<b>Total</b>	<b>48</b> <i>members</i>	<i>51</i>	<i>53</i>	<b>55</b> <i>members</i>	<i>62</i>	<i>73</i>	<i>78</i>	<b>85</b> <i>members</i>

### 3.4. Training, fostering new faculty members to replace retiring teaching faculty members

Year	Total teaching faculty member	Classified by degree						New recruited	Retiree	was/ will be dispatched for training	
		Doctor		Master		University and College				Ph D	Master
		Total	Percentage	Total	Percentage	Total	Percentage				
2013	22	10	45%	10	45%	2	9%		2	9	1
2014	28	16	57%	11	39%	1	4%	6		3	1
2015	34	20	59%	13	38%	1	3%	6		4	
2016	40	22	55%	17	43%	1	3%	7	1	4	
2017	46	26	57%	19	41%	1	2%	6		4	
2018	52	30	58%	21	40%	1	2%	8	2	4	
2019	58	34	59%	23	40%	1	2%	6		4	
2020	65	38	58%	26	40%	1	2%	8	1	4	

### 3.5. Solutions for apparatus development activities

In this stage, it is imperative to train and develop scientific human resource, especially Biotechnology human resource in quantity and quality in order to enhance level, professional capacity, research ability, applying and transferring technology of faculty members of Can Tho University according to General Scheme of Can Tho University to 2020; and it is necessary to globalize and collaborate.

The General Scheme of Can Tho University to 2020 generally and Biotechnology Research and Development Institute specifically, developing human resource for industrialization and modernization of the country and development economy in Mekong Delta project were accepted by the Ministry of Training and Education

Developing human resource is to satisfy the requirement in training which is double in the number of programs (doctor, master, and bachelor) as well as the number of students. Human resource also plays an important role in training human resources and developing economy of Mekong Delta.

Therefore, developing human resources with high level is necessary, especially agricultural biotechnology to participate in training, researching, applying biotechnology to agriculture, and train high level human resource for Can Tho University (Biotechnology Research and Development Institute). There are 3 type of training in developed countries like Japan, USA, and Europe:

**1. Short-term training (3-6 months):** Candidates are senior teaching faculty members with high degree (Master, Doctors). Training fields are food fermentation, food safety, Microbial biotechnology, Protein technology, Genetic technology, Stem cell technology, diagnosis and prevention of plant diseases.

**2. Master training program:** Candidates are new young lecturers. Training fields are: Biotechnology, Biomolecular, Genetic Technology, Microbiology, Plant diseases, Bioinformatics.

**3. Doctor training program:** Candidates are young lecturers with master degree. Training fields are Biotechnology, Biomolecular, Genetic Technology, Microbiology,

Plant diseases, Bioinformatics.

## **4. International collaboration and project management**

### **4.1. Development orientations**

The institute continues to carry out international projects.

The Institute continues to maintain and expand collaborations with training center, institutions and prestigious international organization.

Adding encourage policy to attract individuals and organization to join in international collaboration

### **4.2. Collaboration activities**

Inviting specialized professors to teaching advanced and international programs of the Institute

Exchanging faculty members, students with Japan and ASEAN country

Organizing regular conference with other partners on Biotechnology, Microbiology, Food Biotechnology

### **4.3. Up-coming programs and projects**

- The Institute continues to carry out international projects: Asian Core Program (cooperate with Japan, Thailand, and Laos); RIP project, study on rice breeding for brown plant hopper resistance (cooperate with Belgium); Nafosted, Develop nitrogen fixing microorganisms and environment treatment; Collection of soybean species in Middle and Southern Vietnam (cooperate with USA); Food safety project (cooperate with American Society for Microbiology, USA)....

- Besides, the Institute cooperates with College of Agriculture & Applied Biology to carry out MACBETH project (cooperate with Michigan State University, USA) on “Market Access through Competency Based Education and Training in Horticulture”.

- The Institute continues to take advantage of opportunity to cooperate with Michigan State University (USA) for training Advanced Biotechnology Program.

- Last year, the Institute received 20 turns of international guests coming to visit, lecture for advanced biotechnology program, discuss for collaboration opportunity as well as organize conferences, seminars; among these, there were outstanding delegations coming from USA (MSU, LabCap/ASM); Denmark (Copenhagen University); Japan (Kyoto Institute Technology, Yamaguchi University, Hiroshima University), Malaysia (UPM), Thailand (Khon Kaen Uni., Kasetsart Uni.); Laos (National University); Belgium (Ghent University, Leeuven University, Biotechnology and Biomolecular Institute, Brussels).

### **4.4. Solutions**

The Institute continues to maintain and expand collaborations with training center, institutions and prestigious international organization.

Selecting and training faculty members good at English from excellent students of Advanced Biotechnology Program to replace faculty members who retired

## **5. Material base and facilities**

### **5.1. Objectives**

To enhance training and scientific research capacity

To enhance ability in training, transferring technology for farmers

To invest, equip Biotechnology facilities and equipment in order not to out of date

comparing to other institutes and companies

## 5.2. Suggesting investments for basic construction

Biotech building and Hoa An technology transfer center

## 5.3. Suggesting progress and mobilization financial source for projects

- ODA of Japan, upgrading the University in to an excellent institution project
- Enhancing training capacity and Biotechnology transfer of Can Tho University, project of the Ministry of Science and Technology

## 5.4. Suggesting new facilities investments

New generation gene sequencing machine, high pressure liquid chromatography system, facilities for cloning gene, culturing stem cell and cell reprogramming

### Expected investment (billion VND)

Category	2013	2014	2015	2016	2017	2018	2019	2020
*Workshop for training farmers		20 billion VND						
* Facilities for training farmers			40 billion VND					
* Facilities for technology transfer and trial production				40 billion VND				
** Constructing Biotech building			6,3 million USD					
** Facilities for researching on stem cell			1,5 million USD Facilities, tools for culturing stem cell, cell reprogramming					
** Facilities for Molecular biology			80.000 USD Facilities for extracting DNA, automatic amplify DNA					
** Facilities for Food Biotechnology			205.000 USD Facilities for analyzing food compositions					
**Facilities for Environmental microbiology			140.000 USD New generation gene sequencing machine and accessory					

Facilities for Enzyme, protein			176.000 USD High pressure liquid chromatography system and accessory		
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Note:

\* “Capacity enhancement in Biotechnology transfer program” project

\*\* ODA project, Japan “UPGRADING CTU TO BECOME AN EXCELLENT INSTITUTION IN TRAINING, SCIENTIFIC RESEARCH AND TECHNOLOGY TRANSFER”

### 5.5. Expected investment results

Investment plan for enhancing Biotechnology capacity to support the Institute to keep pace with other prestigious Biotechnology organization in the region is necessary and possible. Thank to this, Can Tho University will have a good start to be an international university.

Training human resource for applying Biotechnology: in 2020, the institute will train 150 Biotechnology bachelor students per year, 65 master students of Biotechnology per year, 35 master students of Microbiology per year, 4 PhD students of Microbiology per year, 6 PhD students of Biotechnology per year, 5 PhD students of Genomic-Variety selection per year (cooperation training); training and transfer technology for farmer and agriculture extension officer: 500 turns/year

## 6. Financial resource – Production and service

### 6.1. Objectives

To apply scientific research results to produce fruit juice, biopharmaceuticals and common enzymes

### 6.2. Required expenditure by years

#### Required expenditure

(Billion VND)

Products	2013	2014	2015	2016	2017	2018	2019	2020
Fresh beer	1	1	0,5	0,5				
Bottled fruit juice	2	3	20	3	3	3	3	3
Biofertilizer	2	3	15	1	1	1	1	1
Enzyme <i>Tag</i>	0,5	0,5	1	1	0,5	0,5	0,5	0,5
Peptinase	0,5	0,5	0,5	1				
Other biopharmaceuticals :Peptidase, albumin ..			0,5	0,5	0,5	0,5	0,5	0,5



### **6.3. Financial mobilization capacity**

According to requirements in section 6.2

### **6.4. Solutions**

Calling for investments from companies

Beer production by Technology transfer service center cooperating with a company; technology transfer by a faculty member of the Institute

Production of bottled fruit juice by the Institute calling for investments and cooperating with Technology transfer service center

Biopharmaceuticals of the Institute will be adjusted for stable quality before being produced; cooperate with biopharmaceutical distribution company.

## **V. CONCLUSIONS AND SUGGESTION**

As a part of general development of Can Tho University, training, scientific research and technology transfer activities of the institute have been fulfilled and had certain achievement. As expectation of Administrators Board, the Institute have been cooperating with other relate College to improve the Biotechnology knowledge level of faculty members and students in Fishery, Agriculture, Environment, Education and Natural Science; In 2014, the Institute will train and research in medical field for human health with the orientation to 2020 to thrive in this field.

The Institute will be main factor in the development of Biotechnology human resource in quantity and quality in order to enhance professional level, training capacity, scientific research and technology transfer of faculty members of Can Tho University. Thank to this, we can train high quality students to satisfy the requirement of develop human resources and social economy in Mekong Delta and the requirement of globalizing as well as be appropriate to General scheme of Can Tho University to 2020.

### *Suggestions*

- To cooperate with Can Tho University of Medicine and Pharmacy to training Medical Biotechnology Program and develop scientific research on Medical Biotechnology and stem cells
- To sign MOU with cooperating International Universities to facilitate the training of international program
- To support the Institute to call for investment to develop production and technology transfer

## **VI. PLAN TO EVALUATE THE PROGRESS**

- Annual check in July every year
- Middle check in July, 2015
- Final check in July, 2017