*J Intl Cooper Agric Dev 2014; 13: 3–12*

Journal of
International Cooperation for
Agricultural Development

Review

# Enhancing Human Resource Capacities in International Agricultural Research: Lessons and Options for Young Japanese Researchers[1]

**Editha C. Cedicol**

Graduate Scholarship Department, SEAMEO SEARCA, College, Laguna 4031, Philippines

## Introduction

The world's food supply depends so much on agriculture. Thus sustained agricultural production is synonymous to food security. However, recent findings reveal that the situation of agriculture supply worldwide has worsened and if food production is not improved to meet demands, the food shortages would affect not only the prices of agricultural goods and services, but also would have impacts on the environment and more so on people living in abject poverty. Many studies by different organizations (*IFAD, FAO, UN Task Force, and WFP*) reveal the following key facts (*IFAD, 2012*):

- There are an estimated 925 million hungry people in the world.
- Around 1.4 billion people live on less than US$1.25 a day.
- The world population is expected to reach 9.1 billion by 2050.
- Food production will need to nearly double by 2050 in developing countries.
- About 40 per cent of the world's arable land is degraded to some degree and will be further affected by climate change.
- There are about half a billion small farms in the world, supporting around 2 billion people.
- GDP growth generated by agriculture is up to four times more effective in reducing poverty than growth generated by other sectors.
- Poor people spend between 50 and 80 per cent of their income on food

According to a research team of the University of Minnesota, U.S.A. and McGill University, Montreal the demand for food globally is expected to double by 2050 due to increasing population and living standards. The team posits that with seriousness and dedication, solving the world's food supply problem and at the same time taking care of the environment can be done. The team's research revealed initial findings that by combining information from crop records and satellite images gathered around the world, new models of agricultural systems and environmental impacts can be created, which then showed patterns from which they based their recommendations on approaches on how to confront the problem and help policy makers in making decisions (*University of Minnesota, 2012*).

To meet the increasing demand for food over time, agriculture productivity needs to be substantially increased through improved agricultural practices, development and promotion of innovative technologies, and efficient and effective scientific agricultural research. And of course, this should not be done at the expense of the environment.

Researchers at McGill University came up with a plan that laid down recommendations on approaches that can provide solutions to the problem confronting global food supply with less impact on the environment. The 5-point plan is quoted hereunder from the *Science Daily, October 2011*:

1. Halting farmland expansion and land clearing for agricultural purposes, particularly in the tropical rainforest.

[1] Paper presented at the International Symposium on Human Resource Development in Agricultural Science on the theme, "Toward Fostering Japanese Researchers to Play an Active Part in International Agricultural Research, held at ESSAM Head Office, Chiyoda-ku, Tokyo, Japan on 9 November 2012.

This can be achieved using incentives such as payment for ecosystem services, certification and ecotourism. This change will yield huge environmental benefits without dramatically cutting into agricultural production or economic well-being.

2. Improving agricultural yields. Many farming regions in Africa, Latin America and Eastern Europe are not living up to their potential for producing crops— something known as "yield gaps." Improved use of existing crop varieties, better management and improved genetics could increase current food production nearly by 60 per cent.
3. Supplementing the land more strategically. Current use of water, nutrients and agricultural chemicals suffers from what the research team calls "Goldilocks' Problem": too much in some places, too little in others, rarely just right. Strategic reallocation could substantially boost the benefit we get from precious inputs.
4. Shifting diets. Growing animal feed or biofuels on prime croplands, no matter how efficiently, is a drain on human food supply. Dedicating croplands to direct human food production could boost calories produced per person by nearly 50 per cent. Even shifting nonfood uses such as animal feed or biofuel production away from prime cropland could make a big difference.
5. Reducing waste. One-third of the food produced by farms ends up discarded, spoiled or eaten by pests. Eliminating waste in the path that food takes from farm to mouth could boost food available for consumption another 50 per cent.

Given the aforementioned projections and the possible solutions presented, can one just sit back, relax and adopt a wait-and-see attitude? Can governments, especially in developing countries, just put off for tomorrow what they should start doing today, adopt a business-as-usual stance, and wait if these will really happen in 2050? Or should the best human resources involved in agriculture development be mobilized to proactively address this bleak scenario?

## II. Challenges in agricultural human resource development

Application of technological advances in agriculture development necessitates the development of qualified human resources to conduct scientific researches to improve agricultural production. The commercialization of agricultural systems, increasing trade liberalization, changes in the role of public and private sectors, technological advancements, and a whole new world of challenges have strongly affected the capacity development needs of the agricultural workforce. These require policy and institutional reforms and the need to review agricultural education systems, and institution of innovative approaches to strengthen the knowledge and enhance the skills of agriculture personnel.

Capacity building is an important key to improving the capability of agricultural researchers, research managers and extension workers in identifying priority research and development issues, formulating research projects to address these issues, and disseminating research findings for use by scientists, academicians, trainers, extension workers, and policy makers. Capacity building takes the form of formal degree, short term training, participation in study tours, conferences, seminar-workshops, on-the-job training, field work, hands-on practice, academic mobility, and exchange programs. There are a number of training institutes and organizations that provide these types of capacity building programs. However, universities and training institutions that are mandated to provide formal and non-formal training must keep pace with the fast changing global needs by equipping students and research staff with the up-to-date knowledge, skills and the right attitudes to help them compete and be responsive to new challenges.

Recent studies reveal the following top challenges to agricultural HRD:

- **Aging agriculture research/scientific and academic staff**

This happens when there is no well-defined and institutionalized medium to long-term succession and replacement plan under the human resource development program of the university system.

- **High staff turnover**

Fast staff turnover is normally due to low incentive system, lack of opportunities for advancement or promotion, low morale among the staff, absence of career development program for the staff, and attractive offers outside the organization.

- **Wide age and qualifications gap in the succession hierarchy**

A well-designed and well-planned succession hierarchy should spell out clearly the chain of command and delegation of authority within the organization. It should define the qualifications needed for a certain level of responsibility and authority. The problem arises when the very senior supervisor (in age, qualifications and experience) has a very junior staff next in line that cannot make firm decisions or recommendations in behalf of the supervisor for lack of experience. This is an issue that should be earlier addressed at the recruitment stage. However, if there are no highly qualified applicants, some organizations resort to hiring very young staff with a plan to train the staff when already on board. Unfortunately for some, the learning curve takes longer, and training takes a while for the young staff.

- **Low budget for research and training activities**

This is often experienced by government-funded institutions. This is an issue that needs to be addressed by governments that recognize the importance of research and training activities as vital to the enhancement of skills of those comprising the agricultural workforce.

- **Outdated curricula not addressing agricultural HRD needs of the times**

This is an ongoing concern among agricultural higher education institutions. The agriculture curriculum needs to be reviewed and modified to address the needs of the job market. Every curriculum must be designed with the students and learners in mind, that is, what kind of skills should this curriculum teach, what learning outcomes, and what kind of students is the university expected to produce for which sector. The curriculum must reflect the vision and mission of the university. In addition, agricultural education must include dimensions of broad-based agro-ecological systems (R.J. Salvador, et al, 1994).

- **Outmoded research and academic facilities**

New or modified curricular programs attuned to the times must be matched with up-to-date research and academic facilities in order to compete with or complement those available in other universities offering the same programs. Sufficient budget is needed to upgrade the laboratory, experimental stations, IT facilities for teaching and learning, etc.

- **Agriculture as a profession not attractive to students**

This has been a continuing problem everywhere. The review of the agriculture curricula starting from the high school to the graduate school level to incorporate practical projects in agriculture has been recommended by some universities in selected countries in the African (FARA, 2011) and Asian (2010) regions. This is because the proponents believe that cultivating appreciation for agriculture as a profession and connecting it to food and nutrition should start at least with students at a young age. In the Philippines, projects on school gardening and nutrition-sensitive agriculture are being introduced at the elementary and high school levels.

It is also worth looking at the reasons why agriculture has lost its luster and what other courses related to agriculture are now in demand. A study conducted in the Philippines on the supply and demand for agriculture, forestry and natural resources graduates projected the decline of traditional agriculture courses (agricultural education, agriculture, forestry) by 2020 but identified growth centers in the nontraditional courses such as agribusiness/agribusiness management, food technology, agricultural engineering, and veterinary medicine (Briones, 2010). August Temu of the World Agroforestry Center (ICRAF) who chaired a panel session in a conference on development of human resources in Africa in December 2011 said that "agriculture is not popular with young people, and most students only come to agriculture when they fail to get into other programs and that most agriculture graduates do not get access to jobs. (FARA, 2011).

- **Agriculture graduates are not well-equipped with knowledge, skills and attitudes to compete globally**

Agriculture students must be able to develop skills to solve problems in multiple-goal situations (Salvador, 1994). On the other hand, universities and faculties teaching agriculture must be aware of the current issues and problems confronting agriculture development and what knowledge, skills and attitudes are necessary in order to prepare the students to face these challenges. Programs for continuous training and upgrading of student and staff competencies must be institutionalized in the university. There are a number of training service providers and agencies that offer short courses for skills enhancement. Examples of these agencies in Japan are the Japan International Cooperation Agency (JICA), the Japan Society for the Promotion of Science (JSPS), the Japan International Research Center for Agricultural Sciences (JIRCAS), and the Ministry of Education and Training, which provide training scholarships and grants for research fellowships.

## III. Initiatives to address agricultural HRD challenges: the SEARCA way

In most developing countries in Southeast Asia, skills mismatch is an attendant problem in education service delivery. Thus, to ensure that the right people are trained for the right jobs, it is highly important for each country to carefully identify the appropriate critical skills necessary in mapping out development plans for agricultural and rural development (*Cedicol, 2010*).

How do we address these challenges at SEARCA? SEARCA believes that the capacity of the human resource base to broadly articulate and respond to the changing demands of the global economy largely influences the development directions of any country. Human resources serve as catalysts in ensuring that development reforms and initiatives are effectively implemented and managed.

SEARCA operates on the basis of a five-year strategic plan. Thus, for its Ninth Five-Year Plan, covering fiscal years 2009/2010 to 2013/2014, a task force on external analysis was created to find out the needs of SEARCA's

**Table 1.** Estimated number of agricultural graduate scholarship needs of SEAMEO from FY 2009/2010 to FY 2013/2014

| Country | Fiscal year | | | | | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009/2010 | | 2010/2011 | | 2011/2012 | | 2012/2013 | | 2013/2014 | | | |
| | MS | PhD | MS | PhD | MS | PhD | MS | PhD | MS | PhD | MS | PhD |
| Brunei Darussalam | 10 | 3 | 10 | 3 | 10 | 3 | 10 | 3 | 10 | 3 | 50 | 15 |
| Cambodia | 15 | 5 | 15 | 5 | 15 | 5 | 15 | 5 | 15 | 5 | 75 | 25 |
| Indonesia | 25 | 15 | 25 | 15 | 25 | 15 | 25 | 15 | 25 | 15 | 125 | 75 |
| Lao PDR | 20 | 12 | 18 | 14 | 16 | 16 | 14 | 18 | 12 | 20 | 80 | 80 |
| Malaysia | 10 | 15 | 10 | 15 | 10 | 15 | 10 | 15 | 10 | 15 | 50 | 75 |
| Myanmar | 19 | 7 | 19 | 7 | 17 | 7 | 17 | 7 | 17 | 7 | 89 | 35 |
| Philippines | 170 | 59 | 180 | 61 | 190 | 66 | 190 | 66 | 200 | 72 | 930 | 324 |
| Singapore | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 5 |
| Timor-Leste | 15 | 2 | 15 | 2 | 15 | 2 | 15 | 2 | 15 | 2 | 75 | 10 |
| Thailand | 10 | 15 | 10 | 15 | 10 | 15 | 10 | 15 | 10 | 15 | 50 | 75 |
| Vietnam | 25 | 15 | 25 | 15 | 25 | 15 | 25 | 15 | 25 | 15 | 125 | 75 |
| Total | 320 | 149 | 328 | 153 | 334 | 160 | 332 | 162 | 340 | 170 | 1654 | 794 |

clients in the SEAMEO region and how SEARCA could serve them to the utmost. A quick survey was then conducted in October-December 2008 on agricultural human resource development needs for graduate study (Table 1). The survey also included focal priority areas in research as well as customized training for scholars as input to its 9th 5-year development plan. Respondents of the survey were Ministries of Education, Agriculture and Forestry and Rural Development, agricultural technical agencies, the University Consortium, and agricultural colleges and universities in Southeast Asia countries, namely: Cambodia, Lao PDR, Vietnam, Myanmar, Indonesia, the Philippines, Thailand, Malaysia, Singapore, and Brunei Darussalam.

Results of the external analysis pointed to the following specific needs (grouped by subject matter):

1. Natural Resource Management
   - ○ Strengthen NRM portfolio
   - ○ Watershed management
   - ○ Forest/agro-forest resource management
   - ○ Marine/water resource management
   - ○ Climate change and adaptation/mitigating measures to address them
   - ○ Land utilization and conversion to non-food production
   - ○ Management of green/open spaces
2. Agricultural Competitiveness
   - ○ Impact of increases in commodity process on agricultural transformation
   - ○ Commercialization of agriculture
   - ○ Improvement of livelihood
   - ○ Value chain analyses
   - ○ Market enhancement: value adding/food processing
3. Cross-cutting themes
   - ○ Biofuel-net gain, impact on land use and agricultural produce
   - ○ Rural-urban linkages; urban agriculture
   - ○ Diversification of farming systems
   - ○ Food security and safety
   - ○ Real issues in agricultural science need to increase crop production, reduce poverty

SEARCA's vision is *to be a leading enabler in the science and practice of agriculture and rural development for Southeast Asia*. Its mission is to *"build the capacities of Southeast Asian institutions working toward agricultural and rural development through graduate scholarship, research and development, and knowledge management.*

For SEARCA to continuously and effectively do this in the face of complex global challenges, it has to vigorously look for ways to support young and highly qualified nationals to acquire excellent graduate education that will not only buffer the impact of a graying workforce and fill in the skills gap, but also take on the cudgels of leadership as their more senior colleagues leave the workplace upon retirement.

Among the strategies to achieve the objectives of the SEARCA Graduate Scholarship Program are: 1) provision of more graduate scholarships and grants; 2) exploration and implementation of new scholarship program modalities; 3) provision of opportunities to scholars for customized training; 4) dissemination of scholars' research outputs and achievements; and 5) matching of suitable academic programs of scholars with the needs of member countries. Based on a percentage of the identified needs in Table 1 and within the limits of SEARCA's resources, 169 scholarship slots have been allocated for nationals

**Table 2.** Distribution of new scholarship slots per country and proposed priority fields of specialization from 2009/2010 to 2013/2014

| Country | No. of slots | Priority Fields of Specialization |
|---|---|---|
| Brunei Darussalam | 4 | Agronomy; Agribusiness; Agricultural Extension and ICT in Agriculture; Community Development; Development Communication; Aquaculture; Halal food production and processing |
| Cambodia | 7 | Agronomy; Plant Breeding; Land and Water Resources Management; Agricultural Economics; Climate Change and Risk Management; Biodiversity Conservation; Agro-forestry Management; Agricultural Entrepreneurship; Veterinary Science; Fisheries and Aquatic Resources; Irrigation Technology |
| Indonesia | 14 | Agribusiness; Agricultural Extension; Land and Water Resources Management; Environmental Management; Biodiversity Conservation; Climate Change and Risk Management; Natural Resources Management and ICT; Animal Nutrition; Agricultural Economics; Development Communication; Public Administration and Governance; Food Science and Technology; Farming Systems; Rural Development; Crop and Livestock Production; Forestry Resources Management |
| Lao PDR | 11 | Animal health and nutrition; Agronomy; Agricultural Engineering; Land and Water Resources Management; Irrigation Engineering; Agribusiness; Food Science and Technology; Food Processing and Postharvest Technology; Farm Management; Farming Systems, Community Development; Development Communication |
| Malaysia | 9 | Agricultural biotechnology; ICT in agriculture; biodiversity conservation; food science and technology; postharvest technology; production of high value crops; nanotechnology |
| Myanmar | 8 | Agricultural policy development; rural development and governance; food safety standards; agricultural economics; agronomy; soil science; biofuels development; agribusiness; supply chain management; trade and investment; agricultural biotechnology |
| Philippines | 86 | Agronomy; food and nutrition; animal health; agricultural economics; development economics; land and water resources engineering; environmental management; veterinary medicine; public management and governance; strategic leadership; climate change and risk management; environmental economics; biotechnology and microbiology; animal breeding; agro-forestry; agribusiness; agricultural entrepreneurship; food processing and marketing; |
| Singapore | 1 | Nanotechnology; urban agriculture |
| Thailand | 9 | Agricultural biotechnology; trade and investment; Environment and natural disaster management; biodiversity conservation and management; agricultural economics; communication technology; |
| Timor Leste | 6 | Agronomy; Animal Science; Veterinary Medicine; Fisheries and Aquatic Resources; Agricultural Economics; Forestry and Natural Resources Conservation; Environmental Science; Land and Water Resources Management; Community Development; Development Communication and ICT; Public Administration and Governance |
| Vietnam | 14 | Agricultural biotechnology; Food Processing; Postharvest Technology; Rural Development; Research Management; Integrated Water Resource Management; Climate Change Risk Management; agribusiness; agricultural economics; animal science; veterinary medicine |
| Total | 169 | |

of SEARCA member countries in different priority fields as identified by the respective ministries of education (Table 2). The total number of scholarships over the five-year period may increase depending on availability of partnership funding from other collaborators of SEARCA that are interested in helping these countries.

**Other program modalities and schemes to enhance student's and staff's skills**

Table 3 presents the estimated number of SEARCA scholarships for other program modalities to enhance a student or faculty's skills such as sandwich program, PhD research, academic bridging, and joint and double degree program, and student/faculty exchange program. Members of SEARCA's University Consortium (UC) are tapped to host students and faculty who visit other

**Table 3.** Number of scholarships for new program modalities for FY2009/2010 to FY 2013/2014

| Scholarships for new program modalities | FISCAL YEAR | | | | | Total |
|---|---|---|---|---|---|---|
| | 2009/2010 | 2010/2011 | 2011/2012 | 2012/2013 | 2013/2014 | |
| Sandwich PhD program | 6 | 6 | 4 | 5 | 18 | 39 |
| Academic Bridging Program | 10 | 10 | 10 | 10 | 10 | 50 |
| Double degree/Joint degree (MS) | 2 | 2 | 2 | 2 | - | 8 |
| PhD Research Scholarship Program | 10 | 10 | 10 | 10 | 10 | 50 |
| Student and Faculty Exchange Program | 10 | 10 | 10 | 10 | 10 | 50 |
| Total | 38 | 38 | 36 | 37 | 48 | 197 |

universities under the UC student and faculty exchange program. For students who attend courses in another UC member for a semester or two, the tuition waiver and credit transfer arrangement are applicable. Bilateral arrangements may be explored with the UC members for the sandwich program and joint/double degree program. Established in 1989 through the auspices of SEARCA, the UC is a network of leading agricultural universities in Southeast Asia, Australia, Canada, Germany and Japan whose aim is to enhance graduate education and research in agriculture and natural resources in Southeast Asia. Members of the UC are Institut Pertanian Bogor (IPB) and Universitas Gadjah Mada (UGM) in Indonesia; Kasetsart University (KU) in Thailand, Universiti Putra Malaysia (UPM) in Malaysia; University of the Philippines Los Baños (UPLB); University of British Columbia (UBC) in Canada, University of Queensland (UQ) in Australia; University of Goettingen (UG) in Germany; and **Tokyo University of Agriculture (TUA) in Japan**. Other partner universities that may serve as host institutions of scholars for short-term program modalities and where SEARCA has signed memoranda of understanding include the University of Hohenheim in Germany; **Nagoya University in Japan**; National Taiwan University, Republic of China; Montpellier SupAgro in France; Maejo University in Thailand, and University of Hawaii at Manoa, Hawaii.

**Customized training**

SEARCA also provides opportunities for customized training to its scholars in order to: 1) enhance their technical knowledge and skills while undergoing rigorous academic and research tasks as graduate students; and 2) to prepare them for leadership and management roles when they return to their respective institutions upon completion of graduate studies. Aside from the priority topics for customized training for SEARCA scholars identified in the survey and presented in *Table 4*, the new scholars are required to attend the following basic training courses: 1) Intensive English Course for International Graduate Students; 2) Technical Writing Course; and 3) Training on Research Methodologies.

To enhance the SEARCA scholars' capacities to do research and extension work, the Center provides grants for **re-entry projects for new alumni** in order for them to immediately apply what they learn from the university upon their return to their respective home institutions. The re-entry grant provides start-up money for small research or extension projects with counterpart funds from the alumni's home institution and local government or community.

To provide opportunity to outstanding/excellent faculty of partner universities or advisers of SEARCA scholars, the **Visiting Fellows/Senior Fellows Program** allows the faculty members to carry out their researches while enjoying their sabbaticals. On the same tone, SEARCA also offers **sabbatical leave** for its technical and academic staff within the supervisory/managerial level after 7 years of continuous service to the Center to spend 6 months to one year in another institution (partner or otherwise) for the purpose of 1) rest and renewal, which is a much needed break for intellectual and physical "re-charging; or 2) to do research or write and produce a publication. In both, SEARCA provides research funds, and salary for a maximum of 6 months.

**Learning Events and Executive Forum** on various topics such as Leadership Excellence in Academe Program for Southeast Asia; Research Management for Executives, **Round Table Meetings** on current issues in agriculture development, and a range of other topics on food security and safety, impacts of climate change on agriculture, climate change vulnerability assessment, etc. provide avenues for discussion, exchange of ideas, and expression of opinions that challenge the students and young faculty to engage in intellectual discourse.

**Table 4.** Customized training needs in agriculture of SEAMEO member countries (2009–2014)

- Agribusiness/enterprise development
- Agricultural credit and microfinance
- Agricultural knowledge management and ICTs for poverty alleviation
- Agricultural Policy Formulation
- Agricultural Systems for Poor Communities
- Agriculture Technology Management
- Agroforestry management
- Avian influenza/ transboundary animal-borne diseases
- Biodiversity conservation and rural livelihoods
- Biofuel development and financing
- Bioinformatics
- Community-based natural resources management
- Cross-border trade arrangements
- Disaster Risk Management
- Dynamics of land use change
- Economic and legal aspects of GE applications/GMOs
- Environment & climate change
- Environment Biotechnology
- Food safety and phyto-sanitary measures
- Good Agriculture Practices
- Good Governance
- Impact assessment and poverty alleviation
- Knowledge Management
- Knowledge systems and biodiversity management
- Leadership and management in academe and R and D
- Managing risks for sustainable agriculture in response to climate change
- Natural Resource Management
- Natural Resource Management
- Options for clean development activities in agriculture
- Participatory methodology
- Planning and project management
- Plant Biotechnology
- Policies on commodity markets
- Policy and regulatory issues, including capacity building and biosafety implementation
- Program Management
- Public-private sector partnership in technology management
- Research management
- Resource Generation
- Re-thinking agricultural extension
- Small farmers and their integration in the supply chain
- Socio-cultural, ethical, and political issues in GE applications/GMOs
- Strategic Leadership
- Strengthening rural institutions
- Transition Management
- Use of ICT in agricultural development
- Various application areas for genetic engineering

**Institutional development assistance to selected universities in Cambodia, Lao PDR, and Myanmar**

Recently, SEARCA initiated an institutional development assistance program focused on capacity-building and curriculum enhancement in three universities in Lao PDR (Savannakhet University), Cambodia (Royal University of Agriculture), and Myanmar (Yezin Agricultural University). After the initial phases of the project starting with the reconnaissance visits to each of the three universities, SEARCA mapped out the plan for assistance within the limits of SEARCA's resources but helping out in tapping other sources of funds to implement a three to five - year project in each of the university. The dearth of agricultural human resources to teach and do research is strongly felt in Savannakhet University (SKU), which is a very new university established only in 2009. SEARCA initially responded to this by providing scholarships for academic bridging and master's program to five young faculty of SKU. The need to field experts to SKU in the areas of irrigation engineering, agronomy, plant breeding, soil science, veterinary science, environmental science, curriculum development, and university management is also urgent.

In Royal University of Agriculture (RUA), the issues to be addressed urgently are the aging faculty, fast staff turnover, and lack of agricultural manpower for teaching, research and extension. In response to the request of RUA, SEARCA recently conducted a mentoring workshop for RUA strategic planning attended by RUA top executives in charge of university management, curriculum development, research and development, financial administration, and linkages and international program. This mentoring workshop was intended to guide them through the process of visioning, direction and goal setting, as well as in assessing their strengths, weaknesses, opportunities available and threats to their existence. The top executives are expected to do their own strategic planning exercise together with key personnel at the university after completing the mentoring workshop. SEARCA also provided graduate scholarships to three young faculty members of RUA.

In Yezin Agricultural University, the immediate concern

to be addressed is the review of the agriculture curriculum as well as the need for training on delivery of extension services to farmers and development of programs for responding to the 9-point agenda for reform of the Ministry of Agriculture, namely: Reform for Land Management and Administration; Reform for Advanced Agricultural Practices and Seed Industry; Reform for Water Resource Management; Reform for Agricultural Mechanization; Reform for Advanced Agro-based Industry; Reform for Human Resource Development; Reform for Research and Technology Development; Reform for Credit Services; and Reform for Market Information Service.

## IV. Developing the next generation of Japanese agricultural scientists and researchers: How?

There is no perfect recipe for this. However, there are lessons that can be gleaned from the experiences of other human resource development organizations like SEARCA, as discussed in the previous Section, on strategies and modalities to enhance the capacities of agriculture personnel to increase their chances of getting employed and involved in international agricultural research. SEARCA's ongoing projects on institutional development assistance to other universities could serve as windows of opportunities for young Japanese researchers to practice their profession by being attached to these institutions with funding from the Japanese government. As well, there are options for young Japanese agricultural scientists and researchers in crafting their career paths towards contributing to finding solutions to the world's food supply problems starting with the East Asian region.

There are two issues in this Section. One is the observation that there are very limited agricultural human resources in Japan that could play active roles in the international agricultural research. The other is the employability of Japanese agriculture graduates.

The first issue should be directed to higher education institutions, policy makers and organizations concerned with developing manpower for the agriculture workforce. The following may be taken into consideration with the aim of increasing enrolment in agriculture and producing more agriculture graduates:

1. Improvement of the agriculture curriculum at the college and graduate school levels to include problem-based experiential teaching and learning to help develop the problem-solving and critical thinking skills of agriculture students. The curriculum must teach appropriate methods of inquiry, and systems analysis. More coursework must be introduced to provide the theoretical foundation to support research applications. New areas of major specialization at the graduate level must be introduced to cater to current needs and problems.

A recent SEARCA study (Arboleda, 2012) on Enhancement and Strengthening of Graduate Agriculture Education Curricula in Southeast Asia revealed that...

> "ASEAN universities typically offer the traditional major specializations (for example: animal science, agronomy, entomology and plant pathology, soil science, and agricultural economics) at the MS and PhD levels. However, they differ largely in the range of new areas of major specialization offered by their graduate school. Some universities tend to offer major specialization at the disciplinal level such as agricultural biotechnology, plant breeding and genetics, animal reproductive physiology, and so on. Others, however, tend to offer major specialization at the commodity level like, plantation management, poultry production, swine production, water management and so on. At the PhD level emphasis tend to be at the disciplinal more than the commodity orientation. Consequently, there are significantly wider varieties of major specializations offered at the MS than at the PhD level. This is understandable since at the PhD level, students are expected to focus more on deeper understanding of as well as finding new knowledge about the discipline through scientific research.

2. New schemes or other modalities of learning such as North-South and South-South mobility for students and faculty, practicum or hands-on experiences through on-the-job training activities, field visits/ study tours, sandwich programs, exchange programs with transferrable credits must be designed and embedded into the curriculum. Through these modalities, students are expected to open up, adjust socially, speak up, learn other people's cultures, understand other people's perspectives, and start thinking out of the box.
3. Have a manpower plan. Coordinate with industry, non-government organizations, private companies, international research agencies that are potential employers of agriculture graduates; find out their manpower needs, and set target numbers to match graduates with the job market needs. This would then set the enrolment and graduation targets for each school year.
4. Provide opportunities for training in leadership, agribusiness management, entrepreneurship, project development and management, resource generation, ICT, computer skills, data banking, language training, technical writing, as add-on to the academic program of the students.
5. Provide sabbaticals to faculty and research staff/ scientists for a period of six months to one year to allow them to upgrade their knowledge and skills,

expand their horizon, establish contacts and explore opportunities for joint projects with other universities or institutions. Whatever new knowledge and skills that these faculty and research staff will gain from doing sabbaticals outside the country will redound to the benefit of the students and the university in Japan.

6. Monitor and track down the alumni. They can be partners in training and development of would-be scientists and researchers. They can be an addition to the pool of short-term staff that can be tapped as consultants, experts, mentors, and student advisers.
7. Provide support for career counseling and the conduct of job fairs. Graduating students must be taught how to write their resumes, construct application letters, present themselves properly during interviews, and answer interview questions. An office at the university devoted to scouting for job opportunities must be set up to coordinate with domestic and international companies in providing work for agriculture alumni and young researchers.

For all of the above strategies, sufficient budget and policy support are essential.

The second issue is both a concern of the higher education institutions and the student. The student must first ascertain his/her career choice by answering the question: WHAT DO I WANT TO BE? For this, the student has several career options: to be a researcher, scientist, academician, entrepreneur, manager, administrator, farmer, agriculturist, economist, extension worker, etc. Whatever it is, the student must aim to be a well-rounded person, who knows how to perform multiple tasks, and a person who values man and nature. The student's career choice would then be his/her basis for seriously considering the road to take towards achieving his goal—academic program, specialization, training and other learning tools, what type of skills to develop, and plans for international exposure.

A survey conducted by a team of experts among potential employers of agriculture graduates in the Philippines (de Vera, et al, 2010) reveal the preferences of employers to candidates that have the following skills: excellent written and verbal communication; organizational development; critical thinking; advanced computer skills; customer relations and people skills; teamwork; English proficiency; leadership skills; business orientation; project development management; negotiation skills; proficiency in another foreign language; monitoring and evaluation; coaching/mentoring; planning and organizing; goal setting and resource allocation; ability to translate theory into practice; data analysis; mathematical/statistical skills; proposal writing and technical report writing.

On the other hand, the recent SEARCA study led by Arboleda, et al (2012) revealed the following findings from respondent- employers in the ASEAN region:

> "When hiring applicants, the employers consider the following qualifications as most important: academic performance records (96%), record of accomplishments (72%), graduated from highly prestigious institution (72%), and overall personal character (60%). For the employers, the most desirable sets of abilities that the graduate degree holders in their staff to have are: technical knowledge (82%), leadership skills (60%) and communication skills (47%). When asked which combination of abilities and skills that were characteristic of their employees possessed, the overwhelming majority of them indicated that those with high field specific knowledge and skills as well as those that a good balance of field specific skills and the skills common to related disciplines – communication, leadership, computer literacy – contributed most to the attainment of their organizational goals and objectives. And more than just academic records, the other abilities that the respondents indicated as most preferred include: ability to take leadership roles in opportunities that are related to his/her field (80%), ability to work professionally with others (76%) and ability to bring bright ideas on appropriate situations (76%)."

In the study, Arboleda emphasized that in the practice of any profession in agriculture and related disciplines, it is imperative that skills that could sharpen the awareness and ability of students to common challenges and opportunities in their career be acquired, such as communication, management and entrepreneurship and accounting skills (e.g., applied statistics and scientific method, principles of management, leadership, ethics and entrepreneurship, international agriculture and trade and policy, among others).

## V. The Way Forward

Universities, government agencies, private companies concerned with agriculture, and even the parents must work together to craft the future of agriculture students, graduates, and young Japanese researchers if they are expected to play a significant role in fighting global hunger. A scenario-building exercise on world food and agriculture may spark the interest of Japanese students and young researchers on their "rightful place" in the interplay of actors in this interesting planet.

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