Opportunities and Challenges on China-EU Sustainable Collaboration in Agricultural Education and Research: The Case of NWAFU

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1. Introduction

Under the Framework of EU-China Dialogue on Agricultural and International Multilateral System, China and European countries have conducted productive exchanges and cooperation on agricultural product safety and security, sustainable agriculture and animal health, and etc. Exchange of China-EU education and research on agriculture is also a component of China-EU strategic partnership. As one of China’s top universities on agricultural, forestry, environmental and water sciences, NWAFU attaches great importance to the cooperation with the EU universities and research institutes in teaching, research and university administration management in an effort to improve teaching, research and internationalization of both sides.

2. Cooperation between NWAFU and the EU institutions

NWAFU, established in 1934, is a state key university under the direct administration of the Chinese Ministry of Education, and is supported by the central government under the national “Project 985” and “Project 211”. It is China’s first national-level independent agricultural higher education institute, and is one of the 56 universities qualified to run Graduate Schools, and is entitled to enroll “Chinese Government Scholarship” international students. It offers educational programs and research in covering crops genetics and breeding, animal genetics and breeding, clinical veterinary medicine, dryland agriculture and water-saving irrigation, crops pest management, bio-pesticides, protected agricultural science, soil and water conservation and ecological environment restoration, agricultural products process and food safety, viticulture and enology, agricultural and forestry economics and management, agricultural engineering and agricultural bio-technology, etc. Over the years, NWAFU has established collaborative relationships with 115 universities and institutions around the world, over 1000 overseas scholars and scientists paid a visit to the university for seminar, lecturing or collaborative research every year. There are 7 international cooperation centers established at the University such as Sino-US Centre for Soil and Water Conservation and Environmental Protection, Austria-China Research Center for Environment Protection, China-Canada Science and Innovation Center on Arid Agriculture, China-UK Sustainable Agriculture Innovation Network, Secretariat Office, China-Japan Eucommia Institute, NWAFU-Purdue Joint Research Center and Yangling International Academy of Modern Agriculture.
NWAFU has been in good relationship with over 30 European universities and research institutes, and has signed Memorandums of Understanding or Cooperative Agreement with institutions such as Technical University of Munich, Germany, Rothamsted Research Institute, UK, Helsinki University, Finland, Wageningen University, Netherlands, University of Natural Resources and Applied Life Sciences, Austria, Poznan University of Life Sciences, Poland, etc. and conducted various exchange activities such as students exchange, scholars and faculty exchanges and collaborative research, and jointly held international conferences, etc.

In education cooperation, NWAFU has developed Honors B.Sc. Program with Wageningen University, a student exchange program with Dublin Institute of Technology, and has joined Ph.D. and Post-Doc Scholarships program with Eurasia-Pacific Uninet, Austria. We also participated “Eurasia” program in Erasmus Mundus External Cooperation Windows coordinated by University of Natural Resources and Applied Life Sciences, Vienna, “Eurasia2” program coordinated by Czech University of Life Sciences, Prague; M.Sc. European Forestry program coordinated by University of Eastern Finland (the former University of Joensuu); International Master on Horticultural Sciences program coordinated by University of Bologna and Erasmus Mundus Master degree in Sustainable Animal Nutrition and Feeding program coordinated by Wageningen University. The University is in the process of application for Erasmus Mundus European M.Sc. Degree in Food Science, Technology and Nutrition program coordinated by Catholic University College Gent. With the support by Outstanding Youth Teachers Program and Postgraduate Scholarship Program sponsored by China Scholarship Council (CSC), there have been 61 young scientists from the university been to EU universities and institutions doing research as visiting scholars, and up to 240 students studying for doctoral degree or joint doctoral training in EU universities.

In research cooperation, NWAFU has been doing well with its partner institutions. Under the China-UK Sustainable Agriculture Innovation Network, NWAFU conducted the Improve Nutrient Management, Reduce Nitrogen Non-point Pollution program with Rothamsted Research. By optimizing nutrients and nitrogen fertilizer management, this Program aims to lower nitrogen fertilizer usage while keeping or raising the crop yields and to reduce the nitrogen fertilizer residue’s impact on environment. Through joint research, an improved fertilizer usage was developed and widely applied in Shaanxi Province. The article “China's Push to Add by Subtracting Fertilizer” was carried in SCIENCE on February 12, 2010, reporting exclusively the outcome of this 3-year program in Shaanxi. The University collaborated with Technical University of Munich for the programs of Study on Forestation in North Shaanxi Loess Plateau to Restore Natural Vegetation and Prevent Soil Degradation, Bio-atmosphere Restoration on Degraded Soil in South Shaanxi Mountainous Area by Forestation and Loess Plateau: Reforestation on Degraded Soil, co-authoring with Technical University of Munich for a thesis collection entitled The Loess Plateau in Central China: Biological Restoration and Management and a book Flora of the Loess Plateau in Central China. The University's Institute of Soil and Water
Conservation of joined the program of *Desertification Mitigation and Remediation of Land* coordinated by FP6, which involved 28 institutions from 16 countries. This program selected 18 typical soil degradation cases in all 16 countries for the improvement of sustainable management on land and enhancement of human accommodation to environment change by the research on different regional desertification problems, and to eventually solve the problem of land desertification that has been distressing a quarter of the world population. In 2011, Professor Hu Yin'gang from College of Agronomy, NWAFU participated in the Program *EU-China Partnership Initiative in Plant Breeding* coordinated by FP7 with University of Barcelona, Spain, Rothamsted Research, UK and Germany Botanical Institute.

### 3. Challenges and opportunities

Based on the principle of equality and reciprocity in cooperation, the universities and research institutes from China and Europe have benefitted significantly from the frequent faculty and student exchanges between both sides. Meanwhile, both parties are facing challenges in agricultural education and joint research.

i. **Language barrier.** Differences in language and culture have caused poor communication between scientists from China and those from the EU, which results in the low efficiency in the facilitation of partnerships as well as the implementations of future cooperation and exchanges expected to benefit both sides.

ii. **Articulation of academic credits.** The fact that there is not mutually-recognized accreditation of credit transfer system such as length of academic years and transferring of academic credits has affected the effective implementation of student exchange programs in a sense. In the “Bologna Process”, the EU partner public universities have gradually developed comparable and interchangeable degree and academic program systems, in which the articulation of credits are the critical factor in the unification of the EU higher education. The current agreements that NWAFU has signed with its partner institutions focus on mutual recognition of academic diplomas and degrees, but didn't mention the provisions for transferring credits.

iii. **Joint research application mechanism.** The differences in organization system and culture between China and the EU have affected the information linkage and the application for joint research among scientists from both sides. At present, the EU “Framework Program for Research and Technological Development” is the main instrument of the European Union to provide funding for research and innovation in Europe. Chinese scientists and research institutions would very much like to join the related joint research programs, yet they are not well-informed of the application mechanisms and the expected benefit they could get accordingly. Likewise, the EU scientists wish to get more open and transparent information from China concerning joint research programs. Thus, the cooperation plan between China and the EU meets difficulties in getting financial support from both sides for lack of accessible application mechanisms for bilateral or multilateral joint research programs.
iv. The needs for cooperation with industries. The agricultural technological collaboration between China and the EU has been mainly focused on publications and the introduction of improved quality animal and plant varieties from the EU to China while neglecting the practical transformation of high-tech achievements. NWAFU, located in Yangling, the birthplace of the Chinese agricultural civilization and China's only national Agricultural High-tech Industries Demonstration Zone as well as the heartland of Shaanxi Province, needs to get its technological achievements transformed into enterprises so as to carry forward its commitment to serve society through education, research and extension.

The year 2011 is the outset of China’s “Twelfth Five-year” Plan period, in which China is experiencing a critical period of accelerating the economic transformation, and will focus on building a resource-economical and environment-friendly society. Similarly, the EU has launched “Europe 2020”, the EU’s growth strategy for the coming decade, which aims to build the EU into a smart, sustainable, inclusive economy. In May, 2011, Chinese President Hu Jintao held a talk with visiting European Council President Herman Van Rompuy, during which President Hu said that China will work with the EU to further outline the overall development of China-EU relations and lift China-EU comprehensive strategic partnership to a new level. All these show that China and the EU are facing a rare opportunity for the development of agricultural education, research and cooperation.

4. Conclusion: our strategy for future China-EU collaboration

Over the past years, NWAFU has made positive progress and outstanding achievements in expanding international cooperation and exchange. To better seize developmental opportunities and promote further collaborations between the University and the EU institutions, it will implement the internationalization strategy as its major initiative for further development, striving to make breakthrough from the following aspects:

First, improve its education quality through globalization NWAFU will take effective steps to accelerate the internalization of talent cultivation, which include better implementing the “Postgraduate Scholarship Program”, the “Honors B.Sc. Program” with Wageningen University and “2+2” undergraduate programs. It will allocate special funds for student exchange programs, provide scholarships for international students to study for degrees or get academic training at the University.

Second, advance the internationalization level of faculty and staff. In accordance with its academic program development, NWAFU will strive to recruit overseas high-level talents to work for the university, and will set up designated funds to invite overseas scientists and scholars to conduct teaching or academic research, and continue the overseas training program to raise the academic level, enlarge global vision and advance the administrative management capacity of its faculty and staff.
Third, facilitate scientific cooperation capacity through international exchange. NWAFU will deliver high levels of scientific cohesion by making most of its ongoing research platforms, encouraging scientists to apply for international joint research programs, and supporting scientists and professors to participate in cooperative research at bilateral, multilateral, regional and global levels. Referring to the mode of the EU Erasmus Mundus programs, the University will start programs for training on-field experts in agronomy and horticulture to better serve the agriculture industry.