

Graduate School of Agricultural and Life Sciences/ Faculty of Agriculture

The University of Tokyo 2019-2020

The University of Tokyo Graduate School of Agricultural and Life Sciences / Faculty of Agriculture

2019 - 2020



Overview of the Graduate School / Faculty

5
Chronology
Organization
Number of Academic and administrative staff
Required Units and Years for Degree
Enrollment of Students
Enrollment of International Students 12
Overseas Research Visits by Faculty Members
Hosting International Researchers
International Academic Exchange Agreements

Departments

Department of Agricultural and Environmental Biology	
Department of Applied Biological Chemistry	
Department of Biotechnology	
Department of Forest Science	23
Department of Aquatic Bioscience	
Department of Agricultural and Resource Economics	
Department of Biological and Environmental Engineering	
Department of Biomaterial Sciences	
Department of Global Agricultural Sciences	
Department of Ecosystem Studies	
Department of Animal Resource Sciences	
Department of Veterinary Medical Sciences	

Research and Education Programs

Agricultural Bioinformatics Research Unit	42
AGRI-COCOON	. 43
One Earth Guardians Development Program	. 48
International Program in Agricultural Development Studies (IPADS)	. 47

Affiliated Institutions

Institute for Sustainable Agro-ecosystem Services	50
The University of Tokyo Forests	. 51
Animal Resource Science Center	. 52
Veterinary Medical Center	. 53
Fisheries Laboratory (Aquatic Bioscience Research Center)	. 54
Isotope Facility for Agricultural Education and Research	. 55
Technology Advancement Center	. 56
Research Center for Food Safety	. 57
University Library for Agricultural and Life Sciences	. 58

Overseas Research Center

Center for Biodiversity and Ecosystem Restoration in Mongolia	60
	~ ~

Related Research Centers

Biotechnology Research Center	62
Asian Natural Environmental Science Center	64

MAP

Overview of the Graduate School / Faculty

Message from the Dean

Nobuhiro Tsutsumi, Ph.D. Dean of the Graduate School of Agricultural and Life Sciences and Faculty of Agriculture

The Graduate School of Agricultural and Life Sciences/ Faculty of Agriculture undertakes education and research in the areas of agriculture, forestry, fishery, the livestock industry, and the food industry, focusing on production, processing and logistics as well as in the socio-scientific conditions surrounding these sectors. We are also interested in factors essential to enhancing quality of life, for example, urban as well as rural landscape, and companion animals such as dogs and cats, etc.

Modern agriculture has helped save countless people from hunger by contributing to maintain a stable food supply. This was made possible by establishing a high-input, high-output agricultural system that boosts yields through the extensive utilization of chemical fertilizers and other agrochemicals. It is fair to say that agricultural science has achieved impressive results in this respect. However, the enormous impact that this kind of high-input agriculture and unrestrained agricultural development have had on the environment has become a huge problem, and there is now a growing demand for sustainable agriculture that takes the global environment into account. The Earth's population, which currently stands at 7.2 billion people, is forecast to reach 9.7 billion by 2050. Ensuring a stable, safe food supply and safeguarding the global environment are the most significant issues facing humanity, and the role of agricultural science in developing technical and social countermeasures to address these issues is growing ever more important.

Agricultural science is an academic discipline that seeks to balance the utilization of various living organisms with the safeguarding of the global environment. It links a wide range of fields organically, from life sciences and environmental science to humanities and social sciences, both at the fundamental and the applied level. Living organisms possess an immeasurable range of functions, of which we are currently using only a tiny fraction. By elucidating the characteristics of organisms, agricultural science is expected to play a major role in building the future of human society. Discovering and making use of new organismal functions that can contribute towards resolving environmental and food issues is also an important task of agricultural science. Agricultural science could therefore be described as an academic discipline that contributes towards building a sustainable society by effectively exploiting biological functions.

The Graduate School of Agricultural and Life Sciences conducts research in order to enhance understanding and implementation of life: studies are conducted from the molecular level. the level of individual organism, to the level of community/colony, the ecosystem, and the biosphere. We engage in cutting-edge research in the laboratory and on the field both in Japan and overseas, targeting a wide range of organisms and their products, from microorganisms such as bacteria and veast to animals and plants of higher hierarchy. And while aspiring to achieve an in-depth understanding of specialized fields, we are also working to expand our interdisciplinary educational programs designed to enable students to appreciate how agricultural science integrates multiple disciplines. With the AGRI-COCOON project (the Agricultural Research Incubator Community for Cooperative Network of Public, Administrative, Business and Academic Sectors), an educational program entailing cooperation between industry, academia, government and private institutions, we offer a solutions-driven educational program through activities undertaken in collaboration with business enterprises and government agencies. Under the Agricultural Bioinformatics Education and Research Program, we implement practical basic education in agriculture-related bioinformatics, along with individual research guidance. In addition, a World-leading Innovative Graduate Study Program (WINGS) for environmentally-friendly agricultural science was launched in the 2018 academic year. The goal of this program is to cultivate professionals capable of collaborating with a wide variety of stakeholders on sustainable biological production, minimizing the burden on the environment through a transition to data-driven production and distribution of foodstuffs and bio-resources.

The Faculty of Agriculture offers curriculum that enables students to learn agricultural science in a step-by-step, systematic manner, with the aim of nurturing both a solid professional expertise and a wide-ranging perspective. Besides lectures, seminars and researches relating to various specialized fields, the Faculty also provides classes with a broad view of agricultural science, on topics such as food and the environment, biodiversity, biomass utilization, etc.

Affiliated institutions of the Faculty of Agriculture include experimental forests, the Institute for Sustainable Agro-ecosystem Services, animal resource science center, fisheries laboratories, the Veterinary Medical Center, etc. These institutions are not only essential to extensive research activities, but it is also at these institutions that students are able to apply the knowledge they have learned in class to actual problem solving.

The faculty and administrative staff of the Graduate School of Agricultural and Life Sciences/Faculty of Agriculture are working together to cultivate future professionals capable of responding flexibly to society's needs, and to foster the advancement of agricultural science as an integrated science.

Chronology

- 1874 The Agricultural Training School established.
- 1877 The Agricultural Training School renamed as Agricultural School.
- 1878 University Farm established.
- 1880 Veterinary Hospital established.
- 1882 The Agricultural School renamed as The Komaba School of Agriculture.
- 1886 The Tokyo School of Agriculture and Forestry established.
- 1890 The Tokyo School of Agriculture and Forestry became The College of Agriculture of The Imperial University consisting of three Departments: Agriculture, Forestry, and Veterinary Science.
- 1893 Department of Agricultural Chemistry added.
- 1894 The University of Tokyo Chiba Forest opened.
- 1897 The College of Agriculture of The Imperial University renamed as The College of Agriculture of The Tokyo Imperial University.
- 1909 Botanical Research Nursery established.
- 1910 Department of Fisheries established in The College of Agriculture.

- 1919 The College of Agriculture renamed as The Faculty of Agriculture of The Imperial University of Tokyo.
- 1925 Department of Agricultural Economics and Agricultural Civil Engineering added.
- 1935 Faculty moved from Komaba-cho, Meguro-ku, to its present location at 1-chome, Yayoi, Bunkyo-ku, Tokyo.
- 1936 Fisheries Research Station established.
- 1946 Part of Department of Agriculture merged with Department of Veterinary Science to form Department of Zootechnics.
- 1947 The Faculty of Agriculture of The Imperial University of Tokyo renamed as The Faculty of Agriculture of The University of Tokyo.
- 1948 Department of Agricultural Civil Engineering renamed Department of Agricultural Engineering.
- 1949 Animal Resource Science Center established.
- 1950 Department of Veterinary Science became independent from Department of Zootechnics. Experimental Station for Landscape Plants established.
- 1955 Radioisotope (RI) Center established.
- 1956 Department of Forest Products became independent



- 1957 Biotron facility setup.
- 1964 Department of Agriculture renamed Department of Agrobiology.
 Department of Veterinary Science and Zootechnics reunited to form Department of Veterinary Medicine and Animal Sciences.
- 1965 Agricultural Library established. Research Facility for Radiation Breeding opened.
- 1984 Biotechnology Research Facilities established.
- 1987 Course in Biotechnology introduced.
- 1988 Department of Veterinary Medical Science reorganized.
- 1991 Course in Animal Resource Sciences introduced.
- 1993 Biotechnology Research Center established.
- 1993 Special Doctoral Course in Agricultural Development introduced.
- 1994 Graduate School of Agriculture renamed as Graduate School of Agricultural and Life Sciences.
- 1995 Asian Natural Environmental Science Center established.

- 1997 Department of Global Agricultural Sciences established.
- 1998 Endowed Chair in Food-induced Bio-Signaling (Meiji Milk Products Co.) established (1998–2008).
- 2000 The 125th founding anniversary celebrated. Construction of Yayoi Auditorium completed. Department of Ecosystem Studies established.
- 2001 Agricultural Library renamed as University Library for Agricultural and Life Sciences.
- 2002 Ebara-Donated Research Unit on Biomass Refinery established.
- 2003 ILSI JAPAN-Endowed Chair of Functional Food Science and Nutrigenomics established (2003–2013).
 - Office for International Cooperation and Exchange (OICE) established.
- 2004 All National Universities, including The University of Tokyo, transformed into National University Corporations.

Koishikawa Arboretum opened (former Botanical Research Nursery).

Agricultural Bioinformatics Research Unit established.

2005 AGRI-COCOON (Agricultural Research Incubator Community for Cooperative Network of Public,



The main gate of The Agricultural School,1877



The college of Agriculture of TheImperial University, 1904



Yayoi Campus,1936



The main Gate of The Faculty of Agriculture, 1938

Administrative, Business, and Academic Sectors) established.

- 2006 Endowed Chair in Clinical Plant Science (Ikeda Scientific Co.) established (2006–2011). Technology Advancement Center and Research Center for Food Safety established.
- 2007 Veterinary Hospital renamed as Veterinary Medical Center.

Endowed Chair in Governance-oriented Civil Engineering for Sustainable National Land Management (Maeda Co. and Kumagai Gumi Co.) established (2007–2009).

Endowed Chair in Taste Science (Nissin Food Products Co.) established (2007–2017).

Special Doctoral Course in Agricultural Development renamed as Special Course for Advancement of Agricultural and Life Sciences.

- 2008 Ninomiya branch of University Farm closed down. Construction of Yayoi Auditorium Annex completed.
- 2009 University Library for Agricultural Life Sciences reopened after renovation.
- 2010 Institute for Sustainable Agro-ecosystem Services established.

Construction of Food Science Building completed. International Program in Agricultural Development



The Yayoi campus,1999

Studies (IPADS) introduced.

- 2011 Ecohydrology Research Institute and Forest Therapy Research Institute established.
 - Experimental Station for Landscape Plants closed down.
 - Endowed Chair in Microbial Metabolic Potential (Institute for Fermentation, Osaka [IFO]) established. The University of Tokyo Forests Executive Office and Education and Research Center established. The University of Tokyo Tanashi Forest opened.

2013 Technical Staff Division established.

- 2015 Endowed Chair in Food and Physiological Models (FORDAYS Co.) established (2015–2020). Special Course for Advancement of Agricultural and Life Sciences renamed as Special Course for Sustainable Agriculture
- 2016 Social Cooperation Program in Nutri-Lifescience established (2016-2021) Social Cooperation Program in Breeding Genomics established (2016-2021)
- 2017 Isotope Facility for Agricultural Education and Research established
 Social Cooperation Program in Health Nutrition estabulished (2017-2021)
 Laboratory of microbial enzyme potential(Amano Enzyme) established (2017-2022)
 One Health Collaboration Research Organization established (2017-2027)
- 2018 Collaborative Research Institute for Innovative Micro-biology established (2018-2028) Collaborative Research on Organization for Future Regional Society established (2018-2028) One Earth Guardians Educational Program established
- 2019 Bioethics Collaborative Research Organization established (2019-2029)
 Endowed Chair in Food Functionality Science established (2019-2024)
 Endowed Chair inData Analysis for Animal Diseases
 - established (2019-2022)

Organization

Undergraduate Courses

Courses	Major
Applied Life Sciences	Biological Chemistry and Biotechnology Applied Biology Forest Life Science Aquatic Life Science Animal Life Sciences Biobased Materials Chemistry
Environmental Resource Sciences	Landscape Ecology and Planning Forest Environmental and Resource Science Wood Science and Timber Engineering Biological and Environmental Engineering Agricultural and Resource Economics Field Science International Sustainable Agriculture Development
Veterinary Medical Sciences	Veterinary Medical Sciences

Graduate Courses

Departments	Courses	Departments	Courses	
Agricultural and Environmental Biology	Bioresource Development Applied Agrobiology Basic Agrobiology Asian Biological Resources Field Production Science	Biological and Environmental Engineering	Rural Environment Engineering Biological Systems Engineering Biological and Environmental Information Engineering Ecological Safety Studies	
Applied Biological Chemistry	Biofunctional Chemistry Agricultural Chemistry Food Science Cooperative Courses	Biomaterial Sciences	Structural Biomaterials Science Material and Housing Sciences Biomass Chemistry	
Biotechnology	Biomolecular Research Biofunctional Research Molecular and Cellular Biosciences Biotechnology Research	Global Agricultural Sciences	Global Animal Production Sciences Global Plant Production Sciences Global Biological and Environmental Sciences	
Earact Science	Forest Life and Environmental Science Forest Resources and Environmental Science		International Development and Agro-Environmental Sciences Cooperative Course	
	Asian Environmental Science Forest Ecosystem Science and Manage- ment	Ecosystem Studies	Biological Conservation Ecosystem Management Bioresources Management Bioresources and Eco-Environmental Studies	
	Aquatic Molecular Biology and Biotechnology Aquatic Production and Environmental			
Aquatic Bioscience Science Aquatic Life Science Marine Bioscience		Animal Resource Sciences	Bio-regulatory Systems Functional Bioscience Bio-animal Science	
Agricultural Structure and Farm Business Management Agricultural and Development Policies and Economics Rural Development Finance Pan-Asia Sustainable Agro-ecosystem Economics		Veterinary Medical Sciences	Basic Veterinary Medicine Clinical Veterinary Medicine Bio-animal Science Food Safety and Science Experimental Medicine	

Research and Education Programs

Agriculturel Bioinformatics Research Unit AGRI-COCOON One earth Guardians Administrative Office

Affiliated Institutions

Institute for Sustainable Agro-ecosystem Services The University of Tokyo Forests Animal Resource Science Center Veterinary Medical Center Fisheries Laboratory (Aquatic Bioscience Research Center) Isotope Facility for Agricultural Education and Research Technology Advancement Center Research Center for Food Safety University Library for Agricultural and Life Science

Number of Academic and administrative staff

Faculty Staff (As of May 1, 2019)								
	Professor	Associate Professor	Lecturer	Assistant Professor	Total	Administrative Personnel	Technical Staff	Total
Graduate School (Faculty)	78	87	3	60	228	65		353
Institute for Sustainable Agro-ecosystem Services	1	3		3	7	5	11	26
University Forests	4	3	5	13	25	13	60	111
Animal Resource Science Center		1			1	2	8	11
Veterinary Medical Center	1				1	4		5
Fisheries Laboratory	1			2	3	1	3	9
Technology Advancement Center					0		9	9
Total	85	94	8	78	265	90	91	524

Center Staff

(As of May 1, 2019)

		Professor	Associate Professor	Lecturer	Assistant Professor	Total	Admin- istrative Personnel	Technical Staff	Total
	Biotechnology Research Center	3	1	1	3	8			0
	Asian Natural Environ- mental Science Center	4	4			8			0
	Total	7	5	1	3	16	0	0	0

Required Units and Years for Degree

(As of May 1, 2019)

	Units	Years
Bachelor Degree	132or139*	4
Bachelor Degree of Veterinary Medical Sciences	198 or 205*	6
Master's Degree	30	2
Doctoral Degree	20	3
Doctoral Degree of Veterinary Medical Sciences	32	4

*Depends on the course of the Junior Division students are admitted.

Enrollment of Students

Undergraduates (International students in parentheses)

(As of May 1, 2019)

	3rd Year	4 th Year	5 th Year	6 th Year	Research Students	Total
Applied Life Sciences	106(4)	157(1)			4(0)	267(5)
Environmental Resource Sciences	105(2)	126(2)				231(4)
Veterinary Medical Sciences	30(0)	32(1)	26(0)	29(1)		117(2)
Total	241(6)	315(4)	26(0)	29(1)	4(0)	615(11)

Graduates (International students in parentheses)

(As of May 1, 2019)

	Master's Program	Doctoral Program	Research Students	Total
Agricultural and Environmental Biology	56(8)	25(11)	1(1)	82(20)
Applied Biological Chemistry	121(18)	47(25)	10(6)	178(49)
Biotechnology	89(9)	39(19)	10(10)	138(38)
Forest Science	44(11)	35(15)	2(2)	81(28)
Aquatic Bioscience	66(10)	46(26)	O(0)	112(36)
Agricultural and Resource Economics	24(11)	17(8)	2(2)	43(21)
Biological and Environmental Engineering	26(4)	15(9)	2(2)	43(15)
Biomaterial Sciences	52(5)	41(16)	1(1)	94(22)
Global Agricultural Sciences	76(36)	36(23)	7(6)	119(65)
Ecosystem Studies	45(3)	16(3)	3(3)	64(9)
Animal Resource Sciences	25(2)	25(5)	2(1)	52(8)
Veterinary Medical Sciences		74(17)	3(0)	74(17)
Total	624(117)	416(177)	43(34)	1080(328)

Academi	ic Year		AY2015			AY2016			AY2017		AY2018		AY2019			
		27 co	ountries/reg	gions	29 co	ountries/reg	gions	33 co	ountries/reg	gions	33countries/regions		jions	38 countries/regions		
	Funds	National	Personal	-	National	Personal	-	National	Personal	-	National	Personal		National	Personal	
Country	/ Region	funds	funds	Total	funds	funds	Total	funds	funds	Total	funds	funds	Total	funds	funds	Total
	Pakistan		1	1			0			0	1		1	1		1
	India	3	2	5	2	4	6	2	3	5	3	2	5	2	1	3
	Nepal	2	1	3	2	1	3	2	1	3	3	1	4	2		2
	Bangladesh	1	2	3	1	2	3	3	2	5	4	2	6	5	2	7
	Sri Lanka	4	5	9	3	4	7	2	3	5	3	3	6	5	1	6
	Myanmar	1	2	3	1	3	4	1	1	2	1		1	2		2
	Thailand	7	2	9	8	3	11	6	3	9	6	3	9	4	5	9
m	Malaysia	4	3	7	4	3	7	4	3	7	5	2	7	4	2	6
Asia	Indonesia	4	3	7	3	6	9	5	7	12	6	9	15	5	9	14
	Philippines	7	3	10	6	2	8	5	1	6	4	2	6	5		5
	South Korea	3	11	14	2	8	10	2	8	10		8	8	1	9	10
	Mongolia	1	1	2			0			0	1		1	1	1	2
	Vietnam	3	6	9	4	6	10	4	6	10	6	6	12	4	5	9
	China	15	77	92	13	110	123	17	132	149	18	158	176	21	178	199
	Cambodia			0	1		1	1		1	1		1	1		1
	Taiwan		16	16		17	17		14	14		13	13		16	16
	Subtotal	55	135	190	50	169	219	54	184	238	62	209	271	63	229	292
st 👎	Afghanistan		1	1		2	2		1	1			0			0
Fas	Iran			0			0			0		1	1		1	1
~	Subtotal	0	1	1	0	2	2	0	1	1	0	1	1	0	1	1
	Egypt	1		1	1		1	1		1	1		1		1	1
	Tunisia			0			0			0	1		1	1		1
	Madagascar	1		1	1		1		1	1		2	2		2	2
	Kenia			0			0		1	1		2	2		1	1
	Tanzania			0			0		2	2		2	2		1	1
	Ghana			0			0	1		1	1		1	1	1	2
rica	Zimbabwe	2		2	2		2	2		2	1		1			0
Af	Rwanda			0			0			0		1	1		1	1
	Burkina Faso			0	1		1	2		2	2		2	1		1
	Botswana	1		1			0			0			0			0
	Mozambique			0		2	2		2	2			0			0
	Gambia			0			0			0			0		1	1
	Benin			0			0			0			0	1	1	2
	Subtotal	5	0	5	5	2	7	6	6	12	6	7	13	4	9	13
-oe-	Australia		1	1		2	2		1	1			0			0
0 @	Subtotal	0	1	1	0	2	2	0	1	1	0	0	0	0	0	0
th rica	Canada			0		1	1		1	1		1	1		1	1
Noi	USA	0	0	0	0	2	2	-	2	2		3	3	-	3	3
4	Subtotal	0	0	0	0	3	3	0	3	3	0	4	4	0	4	4
g	Mexico			0		1	1		1	1		1	1		1	1
Jerio	Bolivia			0			0	1		1	1		1	1		1
ЧЧ	Peru	4		0			0		1	1		1	1		1	1
outh	Ecuador	-	1	1	4	1	U	0	1	U	0	4	U	0		0
al/So	Columbia	1	1	2	1	1	2	2	1	3	2	1	3	2		2
antre	Argentina			U			U			0			U	4	1	1
õ	DIAZII	0		0	4	0	0	0	0	0	0	0	0	1	0	7
	Subtotal	2	1	3	1	2	3	3	3	6	3	3	6	4	3	/
	Germany	1		1	1		1		1	1			U			0
	Spain	1		1	1	4	1	4		0	4		0	4		0
ope	Portugal		1	1	1	1	2	1	1	2	1		1	1		1
Eurc	Bulgaria	1		1	1		1	1		1			0			0
	England			0			U			0			U		1	1
	France	0		0	4		0	0	0	0		0	0	4	1	1
	Subtotal	3	1	4	4	1	5	2	2	4	1	0	1	1	2	3
	iotal	65	139	204	60	181	241	65	200	265	/2	224	296	/2	248	320

Above figures include following graduate students with "Student" visa status:

-Master's course and Doctoral course students

-International Research Students and Graduate Research Students (excluding Special Research Students)

Overseas Research Visits by Faculty Members

Number of overseas research visits by faculty members (by how expenses are borne)

Classification	FY 2015	FY 2016	FY 2017	FY 2018
1. Ministry of Education, Culture, Sports, Science and Technology project	22	28	5	2
2. Grants-in-Aid for Scientific Research <kakenhi></kakenhi>	152	175	181	168
3. Overseas assignment from other government body				
(1) Japan Society for the Promotion of Science	16	38	55	37
(2) Japan International Cooperation Agency	21	13	10	10
(3) Other	83	82	114	127
4. Other funds from Japan	176	164	155	179
5. Foreign government, research institute, or similar	39	65	65	73
6. Personal funds	11	6	14	3
Total	520	571	599	599

Number of overseas research visits by faculty members (by region)

Region	FY 2015	FY 2016	FY 2017	FY 2018
North America	117	94	94	98
Central/South America	36	30	44	26
Europe	108	82	106	99
Africa	19	11	12	15
Middle East	8	5	3	11
China	55	81	77	70
South Korea	24	33	51	49
Other countries-regions of Asia	153	224	207	211
Oceania	15	15	5	20
Total	535	575	599	599

(As of May 1, 2019)

International Academic Exchange Agreements

(As of September 18,2019)

Number of foreign researchers and other persons received (by how expenses are borne)

Classification	FY 2015	FY 2016	FY 2017	FY 2018
1. Ministry of Education, Culture, Sports, Science and Technology project	64	6	0	0
2. Grants-in-Aid for Scientific Research <kakenhi></kakenhi>	19	11	11	7
3. Overseas assignment from other government body				
(1) Japan Society for the Promotion of Science	24	52	32	23
(2) Japan International Cooperation Agency	2	3	3	15
(3) Other	22	33	56	48
4. Other funds from Japan	26	30	54	34
5. Foreign government, research institute, or similar	86	59	0	0
6. Personal funds	26	44	76	123
Total	269	238	232	250

Number of foreign researchers and other persons received

Region	FY 2015	FY 2016	FY 2017	FY 2018
North America	7	16	11	15
Central/South America	5	7	6	8
Europe	27	47	24	65
Africa	2	4	4	2
Middle East	49	65	63	65
China	20	15	30	7
South Korea	152	76	90	85
Other countries-regions of Asia	6	6	2	1
Oceania	1	2	2	2
Total	269	238	232	250

Countries and Regions	Universities/Institutes	Started on
India	Tamil Nadu Agricultural University	May. 27, 2013
	Bogor Agricultural University	Oct. 21, 1988
Indonesia	Gadjah Mada University*	Nov. 22, 2010
	Mulawarman University	Jan. 27, 2006
	Lampung University (Faculty of Agriculture)	Apr. 16, 2014
	Seoul National University (College of Agriculture and Life Sciences)	Sep. 9, 2006
	Seoul National University (College of Veterinary Medicine)	May. 20, 2016
0 11 14	Pukyong National University (College of Fisheries Sciences)	Jan. 24, 2007
South Korea	Pukyong National University (College of Environmental and Marine Science and Technology)	Jan. 24, 2007
	Kangwon National University (College of Forest & Environmental Sciences)	Jan. 31, 2013
	Konkuk University (College of Veterinary Medicine)	Apr. 28, 2015
Cambodia	Cambodian Agricultural Research and Development Institute	Jul. 6, 2009
Sri Lanka	University of Ruhuna	Jun. 7, 2011
	Kasetsart University (Faculty of Veterinary Medicine, Faculty of Agriculture and Faculty of Forestry)	Jun. 8, 1998
	Khon Kaen University (Faculty of Agriculture)	Feb. 3, 2009
Thailand	Agricultural Research Development Agency	Jul. 12, 2011
	Chianmai University	Jun. 8, 2016
	Chulalongkorn University**	Oct. 19, 2018
	National Taiwan Ocean University	Apr. 27, 2006
	National Chung Hsing University (College of Veterinary Medicine)	Mar. 26, 2008
Taiwan	Taipei Medical University (College of Public Health and Nutrition)	Jan. 28, 2013
	National Ping Tung Uiversity of Science & Technology	Jun.12, 2015
	National Taiwan University(College of Bioresources and Agriculture)	Jun. 7, 2016
	Beijing Forestry University	Feb. 25, 1984
	Northeast Forestry University	Dec. 23, 199
	China Agricultural University	Sep. 17, 199
	Nanjing Forestry University	Mar. 9, 2002
	Institute of Soil Science, Chinese Academy of Sciences	Jan. 5, 2007
	Nanjing Agricultural University	Mar. 21, 2007
China	Sichuan Agricultural University	Mar. 29, 2007
	Nankai University*	Dec. 6, 2015
	Southwest University	Jan. 8, 2014
	Northeast Normal University (School of Geographical Science)	Mar. 31, 2015
	Zhejiang A&F University	Dec. 14, 2010
	Hainan University(Institute of Tropical Agriculture and Forestry)	Nov. 6, 2017
	Zhejiang University of Technology(College of Biotechnology and Bioengineering)	Nov. 17. 2017

International Academic Exchange Agreements

Countries and Regions	Universities/Institutes	Started on
Ohina	Fujian Agriculture and Forestry University	Apr. 18, 2018
China	Henan University of Science and Technology	Jun. 22, 2018
Philippines	Central Luzon State University	May. 22, 2018
Vietnem	Hanoi University of Agriculture	Dec. 25, 1995
vietnam	Can Tho University	Jul. 19, 2010
Malaysia	Sabah University of Malaysia	Jun.12, 2017
Myammar	Yazin Agricultural University	Jul. 21, 2017
Mongolio	Mongolian University of Life Sciences	Oct. 13, 2003
Mongolia	National University of Mongolia	Jan. 23, 2018
Argentina	National University of La Plata	Dec. 6, 1990
Colombia	International Center for Tropical Agriculture (CIAT)	Feb. 19, 2010
USA	University of Minnesota(Biotechnology Institute)	Apr. 5, 2017
UK	New Castle University(Centre for Rural Economy)	Apr. 3, 2017
Italy	Marche Polytechnic University	Feb. 6, 2018
Sweden	Swedish University of Agricultural Sciences	Aug. 23, 2004
Cormony	Karlsruhe Institute of Technology	Dec. 7, 2010
Germany	The University of Bonn*	Feb. 3, 2016
Turkey	Ege University (Faculty of Medicine)	Jul. 24, 2014
Finland	Aalto University	Aug. 18, 2010
	AgroParisTech	Jan. 30, 1996
France	IBEB, French Alternative Energies and Atomic Energy Commission	Sep. 7, 2010
	Life Sciences Division, French Alternative Energies and Atomic Energy Commission	Dec. 16, 2014
Poland	University of Agriculture in Krakow	Dec. 5, 2012

*University-wide Agreement ** MoU on Student Exchange Departments

Department of Agricultural and Environmental Biology

The Department of Agricultural and Environmental Biology deals with field crops, vegetables, fruit trees, flowers, insects, silkworm, and plant pathogenic microorganisms, and has made numerous contributions to the sciences related to plant production and environmental conservation. The Department studies issues to create comfortable human environments in the closed ecosystem of the Earth, such as 1) higher crop productivity and quality, and genetic crop improvements, 2) control of plant diseases and insect damage, 3) development of sustainable production systems, 4) development of analytical methods to handle the increasing complexity and volume of biological information, and 5) development of technologies to improve the environment by utilizing plants and insects.

http://www.ab.a.u-tokyo.ac.jp/aeb/index-e.html

Bioresource Development

- Plant Breeding and Genetics
 Genetic and molecular studies on the regulatory mechanisms of important crop traits
- Insect Genetics and Bioscience
 Genetics, genomics, developmental biology, virology, and molecular pathology of the silkworm and insects

Applied Agrobiology

Crop Science

Carbon and nitrogen metabolism in relation to yield performance of various crop species
Mechanisms of environmental stress tolerance in crop plants

 Horticultural Science
 Physiological and genetic studies on improving the quality of horticultural products



Experimental materials include crops, insects, microorganisms, and organelles



Molecular biology experiment room

Applied Entomology

morphology

•Physiological, ecological, and genetic studies on reproduction, dormancy, and speciation in insects

Basic Agrobiology

- Crop Ecology and Morphology
 Ecological and morphogenetic basis for improving productivity and sustainability of plant production systems
- Plant Pathology
 Molecular and biological studies to understand the pathogenicity mechanisms of plant pathogens and host plant resistance
- Plant Molecular Genetics
 •Structure, function, and evolution of genomes in higher plants
- Biometry and Bioinformatics
 Biometric studies on DNA polymorphism, inheritance of quantitative traits, population genetic structure, and plant

Nippon Gene-Endowed Chair

 Clinical Plant Science
 Development of technologies to diagnose and control plant diseases toward establishment of a plant clinic network

Asian Biological Resources (Asian Natural

Enviromental Science Center)*1

- Environmental Stress Tolerance Mechanisms
 Tolerance mechanisms of plants to environmental stresses and development of stress-tolerant plants
- Regional Resources Reassessment
 Sustainable land use and agricultural production under fragile regional conditions
- Genomics of Plant Resources
 Genomics and physiology of wide range of plant resources

Institute for Sustainable Agro-ecosystem

Services (ISAS)

- Field Production Science*2
 Studies on sustainable crop production and its impacts on agricultural resources and environment.
- *1 Cooperative course. The laboratories and their staff belong to the Asian Natural Environmental Science Center.
- *2 Cooperative course. The laboratory and its staff belong to the Institute for Sustainable Agro-ecosystem Services.



Department greenhouses

Department of Applied Biological Chemistry

The Department of Applied Biological Chemistry carries out studies and education across a wide range of research fields related to biological chemistry. In addition to the basic research methodology of biological chemistry, which consists of biochemistry, organic chemistry, and cellular biochemistry, the Department is actively introducing new research methodologies and techniques such as genetic engineering, protein engineering, and cellular engineering. By applying these research methodologies and techniques of food-producing organisms, and food immunology, the Department seeks to discover new bioactive compounds and mechanisms supporting the environmental coexistence of human beings and living organisms, with the ultimate aims of advancing biological chemistry research methodology and the enhanced coexistence of human beings and all living things. The Department's efforts are part of a world network that is developing techniques in bioproduction and biological chemistry.

http://www.xyz.a.u-tokyo.ac.jp/english/xyz/

Biofunctional Chemistry

- Plant Molecular Physiology
 Molecular and cellular biology of plant response and tolerance to environmental stresses
- Biological Function and Developmental Chemistry
 Molecular cell biology, neurology of taste signaling, and biochemistry of food proteins

Agricultural Chemistry

- Plant Nutrition and Fertilizer
 Plant nutrient transport, metabolism, responses to nutritional conditions, and nutrient stress-tolerance
- Biological Chemistry
 Chemistry, molecular biology, and neuroscience of chemosensory signals and receptors in mammals, insects

Organic Chemistry

•Organic synthesis of bioactive natural products and their derivatives to elucidate bioactive functions and their practical application

•Development of new reactions realizing efficient synthesis of optically active substances

- Bioorganic Chemistry
 Chemistry, biochemistry, and molecular biology of bioactive compounds regulating selfincompatibility and interspecies incompatibility in plants
- Soil Science
- •Soil microbiology for sustainable agriculture and environmental conservation
- Chemical Biology
 Chemistry, physiology, and molecular biology for plant growth regulation

Food Science

- Nutritional Biochemistry
 Nutrient regulation of gene expression Differentiation of mammalian cells
- ▶ Food Chemistry

•Chemical and biochemical studies on small molecules,particularly regarding chemicals generated within our bodies and/or encountered in food and our environments,as ligands and triggers of reactions related to our health

Food Biochemistry

•Molecular and cellular biological studies on lifestyle-related diseases Search for food factors that prevent lifestyle-related diseases

- Analytical Chemistry
 Bioinorganic chemistry of environmental science and biomineralization
- Food Biotechnology and Structural Biology
 Biotechnology, structural biology and physicochemistry of proteins, enzymes and foods

Food Functionality Laboratory

 Functional Food Science
 Molecular nutrition, taste science with omics technologies for food and health

Nissin Food Products Endowed Chair

 Taste Science
 Investigation of the molecular logic of sensory events for application in food quality design

Social Cooperation Laboratory

- Health Nutrition
 Molecular nutrition and functional genomics to improve quality of life
- ▶Nutri-Life Science
- Investigating molecular and cellular basis of skeletal muscle integrity to extend a healthy life expectancy



Morphology of the kobito (kbt) mutant of morning glory The kbt mutant has a defect in the biosynthesis of brassinosteroids, a class of plant hormones, and shows conspicuous dwarf phenotype, demonstrating the importance of this hormone function. (left) Two-month old kbt. (right) Seven-week-old kbt and wild-type plants.



A confocal microscope image of Arabidopsis root expressing GFPtagged BOR1 borate transporter carrying mutation at Lys-590 (K590A). The mutant BOR1-GFP localizes in the plasma membrane and shows inward (stele-facing) polarity similar to the wild type, although high boron-induced endocytic degradation of BOR1 is completely blocked by this mutation.



An image of adipocytes stained with Oil Red O. Preadipocyte cells were differentiated into adipocytes accumulated with tons of lipid droplets.

Department of Biotechnology

The Department of Biotechnology maintains high educational and research standards across wide-ranging areas of biotechnology. Employing DNA technology, protein engineering, and cell/tissue culturing techniques in combination with recent advances in biomolecular structure determination, genomic information, and bioinformatics, the Department elucidates the basic mechanisms of a variety of biological functions. Furthermore, the Department is applying these findings to contribute to the prosperity and happiness of human beings.

http://www.bt.a.u-tokyo.ac.jp/english/introduction/

Biomolecular Research

- Molecular and Cellular Breeding
 Analysis and improvement of useful genes in microorganisms
- Bioinformation Engineering
 Computational biology, computational chemistry, and bioinformatics
- Molecular Biotechnology
 Structure, function, and localization of biological molecules

Biofunctional Research

- Fermentation and Microbiology
 Molecular microbiology, biosynthesis of natural products
- Applied Microbiology
 Application of diverse microbiological functions
- Enzymology
 Structure-function relationship of enzymes and proteins
- Microbiology
 Fungal physiology, yeast genomics and chemical genomics, and cell-cell communication
- Cellular Genetics
 Regulation of macromolecular biosynthesis in microorganisms



Microscopic images of vacuoles in *Aspergillus oryzae*, the "Japanese National Microorganism," visualized by differential interference contrast and green fluorescence protein



Crystal structure of cellobionic acid phosphorylase, which plays a key role in biofuel production



Scanning and transmission electron microscopic images of actinomycete Actinoplanes missouriensis sporangia

Cooperative Course

- Environmental Biochemistry *1
- Cell Biotechnology **
- Plant Functional Biotechnology *1
- Microbial Metabolomics (Endowed course)*¹
- Microbial Membrane Transport Engineering (Endowed course)*1
- Microbial Metabolic Potential (Endowed course)
- Brewing Microbiology (Endowed course)
- ▶ Yeast and Fermentation (Endowed course)*2

*1 The laboratory and its staff belong to the Biotechnology Research Center.

*2 The laboratory belongs to the Collaborative Research Institute for Innovative Microbiology (CRIIM).

Department of Forest Science

Our comfortable life is dependent on advanced science and technology and generates major environmental load. Environmental problems on a global scale, such as extreme weather and extinction of species, have become apparent. Degradation of the environment is a serious problem as it relates to humankind. Forests are the biggest terrestrial ecosystems on earth, accounting for about 80% of plant production. They play a major role in hydrological and carbon cycles on a global scale and help conserve the global environment. Extensive human activity leading to deforestation and forest degradation is a cause of deterioration of the global environment. Moreover, forests bring various benefits such as wood resources, pure water, and a comfortable environment, and the use of forests is indispensable to our lifestyles and livelihoods. Forest science is a discipline that helps us to sustainably enjoy the benefits of forests by harmonizing forest ecosystems with human activities.

http://www.fr.a.u-tokyo.ac.jp/en/index.html

Forest Life and Environmental Science

- Forest Botany
 Ecology and physiology of trees
- Symbiology and pathology in forests
 Forest Zoology
 Ecological studies of animals in forest ecosystems
- Studies on management of animal populations in forests
 Silviculture
 Biology for forestation
 Physiology and ecology of forest trees
 - •Pedology and edaphology in forests

Forest Resources

and Environmental Science

- Forest Management
- •Research on integrated management and utilization of forest areas
- Research on forest inventory and monitoring techniques using remotely sensed data
- Forest Policy
- •Studies on policies to manage and utilize forests •Social scientific studies on relationship between human beings and forests



Practical student exercise in a mountain village

Forest Utilization

•Planning and design of forest-road networks •Forestry mechanization and operational efficiency

 Forest Hydrology and Erosion Control Engineering
 Hydrological research on the relationship between forests and the environment

•Soil conservation, landslide and mud flow, and disaster-prevention science

 Forest Landscape Planning and Design
 Planning methods for conservation and creation of living environments

·Planning, design, and management of forest landscape

Asian Environmental Science

(Asian Natural Environmental Science Center)*1

- Tree Physiology and Tropical Silviculture
 Tolerance mechanism of trees to environmental stress
 Development of reforestation methods for deteriorated lands in the Asian tropics
- Forest Symbiology
 Population genetics and reproduction ecology of forest tree species
 Ecology and physiology of ectomycorrhizal fungi
- Tree Environmental Physiology
 Mechanisms of tree environmental responses
 Application for reforestation on degraded lands

Forest Ecosystem Science and Management*²

- Forest Ecosystem
 Conservation of biodiversity and ecosystem functions
 Forest pest and wildlife management
- Forest Functional Biology
 Utilization of biological functions and metabolites of woody plants

 $\boldsymbol{\cdot} \text{Responses}$ of woody plants against biotic and abiotic stress

- Forest and Human Society Relationships
 Relationship between forest ecosystem and human society
 Monitoring and management of various forest informations
- Forest and Water Resources Management
 Watershed function of forests regulating runoff, water resources and water quality
 Sustainable management of forest resources and ecosystem services
- *1 Cooperative course. The laboratories and their staff belong to the Asian Natural Environmental Science Center.
- *2 Cooperative course. The laboratories and their staff belong to the University of Tokyo Forests.



An 80-m-tall canopy crane with a 75-m-long rotating jib in a tropical rainforest, Sarawak, Malaysia



24

Collecting botanical specimens in a practical course

Department of Aquatic Bioscience

The Department of Aquatic Bioscience has the following major aims: 1) find ways to preserve aquatic ecosystems given the global scale of environmental havoc wreaked by humankind, 2) develop self-sustaining fisheries, and 3) investigate ways to contribute to human well-being including food production using knowledge and expertise from other research fields such as biotechnology. The Department's laboratories, including the Fisheries Laboratory on Lake Hamanako and those in the Atmosphere and Ocean Research Institute, are tackling these problems and have achieved many encouraging results. However, the ocean, which has spawned and nurtured life since the Earth's formation, is vast and as yet only partially understood. There is a real need to once again observe biological phenomena in the ocean from a fresh viewpoint and with an open mind.

http://www.a.u-tokyo.ac.jp/english/departments/D-AB.html



School of sardines

Aquatic Molecular Biology and Biotechnology

Aquatic Molecular Biology and Biotechnology
 Development and function of aquatic animal muscles
 Molecular response to environmental stress
 Protein engineering

Aquatic Production

and Environmental Science

- Fisheries Biology
 Management of fisheries resources and ecosystems
 Biology, ecology, and life history of fish
- Fish Disease Research
 Pathology of infectious diseases of fish and shellfish
 Biology and ecology of pathogens
 Host defense mechanisms
- Aquatic Biology and Environmental Science
 Ecology of marine organisms and related environmental changes

Aquatic Life Science

- Aquatic Animal Physiology
 Mechanisms of reproduction and environmental adaptation in aquatic animals
- Aquatic Natural Products Chemistry
 Search for biologically active substances from marine invertebrates
- •Characterization of biosynthetic pathways of aquatic natural products
- Marine Biochemistry
 Functional diversity of metabolic pathways in aquatic organisms

Applied Marine Biology*1

Applied Marine Biology
 Integrative study combining qualitative and quantitative genetics, population genomics, developmental biology and ecology of fish and shellfish



Kuruma prawn



Asian Natural Environmental

Science Center

Coastal Marine Environment Assessment^{*2}
 •Taxonomy, phylogeny, and distribution of harmful marine microalgae

Marine Bioscience*3

- Marine Planktology
- •Phylogeny, life history, and production ecology of plankton and micronekton

•The marine food web and interactions between shallow and deep-sea ecosystems

Marine Microbiology

•Ecology, phylogeny, and physiology of marine microbes Microbial contribution to marine food webs and biogeochemical cycles

 Fish Population Dynamics
 Assessment of exploited fish stocks, establishment of practical fishery management systems, and conservation of marine organisms

- Biology of Fisheries Resources
- •Ecology and physiology of living marine resources and underlying mechanisms of their reproductive fluctuations
- Fisheries Environmental Oceanography
 Studies on coastal and open ocean environments for living resources and related physical oceanography
- Behavior, Ecology and Observation Systems
 Behavioral ecology of marine top predators such as fishes, sea turtles, seabirds and marine mammals
 Development of biologging systems to investigate behavior, physiology and surrounding environment
- International Coastal Research Center
 Basic marine sciences including marine ecology, marine pollution, marine biology, physiology, taxonomy, and
- physical oceanography *1 Cooperative course. The laboratory and its staff belong to the Fisheries
- Cooperative course. The laboratory and its staff belong to the Fisheries Laboratory.
 2 Cooperative course. The laboratory and its staff belong to the Asian Nat-
- 2 Cooperative course. The laboratory and its staff belong to the Asian Natural Environmental Science Center.
 *3 Cooperative course. The laboratory and its staff belong to the Atmos-
- phere and Ocean Research Institute

Department of Agricultural and Resource Economics

How can we meet the global need for foodstuffs and agricultural materials under the growing constraints of natural resources and the environment as well as deficiencies in food distribution, systems, including reconciling production in coexistence with the environment while preventing hunger and ensuring satiation? This challenging issue should be addressed in consideration of fundamental socio-economic elements, e.g., unsustainable development and resource depletion, enlargement of poverty and social inequality, and economic and institutional conflicts among developed and developing countries.

Our department embodies the following two key principles of graduate education and academic research for the new age of agricultural and resource economics.

(1) Global perspective: Our research concerns have become broader and more internationalized beyond traditional agricultural economics to include intergenerational resource conservation, multifunctionality of agriculture, the global food system, harmonization of international trade systems, and rural development and communities, while encompassing new disciplines of other applied economics such as development economics, environmental economics, and institutional economics.

(2) Local perspective: We pay attention to the reality of rural communities and individuals. Our fieldwork approach, through which we have accumulated academic knowledge and established research networks, is one effective method to achieve our aim of comparing Japanese and overseas agricultural economies.

We continue to offer intensive seminars and classes for graduate students, which deepen their professional insight and enhance their communication abilities. In addition, we intend to strengthen intellectual collaboration with other natural science disciplines. One of the keys to solving the aforementioned complex problems is technological progress owing to developments in bioscience and information technology. As a department of Graduate School of Agricultural and Life Sciences, we have an excellent opportunity and favorable position from which to engage in academic dialogue and scientific discussion for the future.

http://www.a.u-tokyo.ac.jp/english/departments/D-ARE.html



Food supply is the basis of our lives

Economic theories and field researches are fundamental at our department

Agricultural Structure

and Farm Business Management

- Farm Business Management and Rural Development
 Management and analysis of farm business
 Management for regional and environmental resources
- Agricultural Structure and Policy
 Comparative studies on agricultural structure
 Agricultural policy
- Agricultural History
 Comparative studies on agricultural development
 History of agricultural sciences

Development Policies and Economics

- Agricultural and Development Economics
 Political economy of agriculture
 Development economics
 Agricultural trade
- Food and Resource Economics
 Food system economics
 Resource and environmental economics

Rural Development Finance

Rural Development Finance
 Risk and agriculture
 Agricultural productivity and technology adoption
 Agricultural market development
 Rural organization

Pan-Asia*

Economic Development in Asia
 Economic development in Asia
 Social and cultural changes in Asia

 * Cooperative course. The laboratory and its staff belong to the Institute for Advanced Studies on Asia.

We seek consistency between efficient agricultural production and favorable rural environments



Department of Biological and Environmental Engineering

The Department of Biological and Environmental Engineering (BEE) deals with the creation and preparation of favorable environments in rural areas and production control of living things. Technologies in this field are essential for appropriate management of natural and biological resources sustaining human beings on the Earth. The Department consists of the six branches of Rural Environmental Engineering (REE), Biological Systems Engineering (BSE), Biological and Environmental Information Engineering (BEIE), Ecological Safety Studies (ESS), Sustainable Agro-ecosystem Engineering (SAE), and Radio Environmental Technology (RET). REE seeks advances in modern technologies associated with the engineering of land resources, water resources, soil conditions, plants, and air resources. It aims to encourage efficient food production and to conserve the Earth's environment, especially in rural areas, by harmonizing production with natural ecological systems. BSE aims to develop advanced techniques and research in bioengineering, biological process control, controlled environment plant production, biosensing and robotics, bioenergy production, and post-harvest technology by making greater use of biological functions. BEIE applies the latest information technology to contribute to the harmonious coexistence of living organisms and the environment as well as optimized food production. It also encompasses the effects of changes in the conditions of both the geosphere and food materials. ESS is an associated branch of the Department of BEE in the Institute for Agro-Environmental Sciences (NIAES), NARO which is located in the science hub of Tsukuba City. NIAES is the leading institute on environmental sciences in agriculture. ESS conducts interdisciplinary studies on atmosphere and soil environments, the material cycle in agro-ecosystems, and ecological statistics as the basis for such studies. SAE cooperative course is in the Institute for Sustainable Agro-ecosystem Services (ISAS) at the Tanashi Campus. SAE conducts research on sustainable and effective use of ecosystem services. RET cooperative course is in the Isotope Facility for Agricultural Education and Reseach. RET conducts research on agricultural rehabilitation in areas polluted by radioactive materials.

http://www.a.u-tokyo.ac.jp/english/departments/D-BEE.html

Rural Environmental Engineering

Land Environmental Engineering
 Improvement of agricultural productivity and sustainability through farmland engineering
 Assessment of sustainability of agricultural system in terms of materials, water and energy balance
 Water and material circulation in the soil–plant–atmosphere continuum



Lettuce production under artificial lighting
 3D image of forest measured by helicopter-borne scanning LiDAR

- Water Environment Engineering
- Development and application of hydraulic and hydrological models for large-scale irrigation systems to improve water management
- Quantitative valuation and demand-oriented provision of irrigation service
- •Control of greenhouse gas emissions from paddy fields through on-farm water management
- •Survey and analysis of water resources and environmental problems in Asian monsoon regions
- Soil Physics and Soil Hydrology
 Unsaturated water and solute transport in soils
 Migration and remediation of metals in soils
 Carbon dynamics in soil and transport phenomena
 Climate change and soil physical conditions
 Erosion and conservation of low-pH soils
 Colloid and _ne-bubble-facilitated transport of chemicals in soils

Biological Systems Engineering

▶ Bioenvironmental Engineering

·Analyses of plant responses to light, gas, and water environments

·Control and analysis of plant environments in greenhouses and plant factories

·Development of advanced plant production technologies and experimental devices for plant-response research ·Advanced technology utilization for plant production and plant-response research

·Ecophysiology and biotechnology in advanced greenhouse horticulture

- Biological and Mechanical Engineering ·Unmanned airboat for lake environment monitoring and
- management

·Unmanned small mower for steep field ·Efficient hydrocarbon production from microalgae •Ethanol production from lignocellulosic biomass

·Sustainable biofuel from Jatropha in Mozambique LCA of various biofuel productions ·Collection and pretreatment of rice straw for ethanol

production

▶ Bioprocess Engineering

·Storage of foods and agricultural products by application of both gas-hydrate formation and freezing ·Non-destructive and real-time monitoring for food safety and guality

·Evaluation of the dynamic properties of micro-/nano-bubble water for application in biosystems

·Prediction of dynamic change in agricultural product guality ·Studies on accumulation of functional compounds in fruits and vegetables during storage

Biological and

Environmental Information Engineering

Biological and Environmental Information Engineering ·Remote sensing of biosphere functioning ·Analysis and modeling of ecosystems

·Analysis of impacts of global environmental changes on ecosystems

Image instrumentation for biomonitoring

·Information engineering for biological and environmental systems



Tone Oozeki barrage for irrigation and municipal water supply

Ecological Safety Studies

- Ecological Safety Studies
- ·Detailed mechanisms of trace-gas dynamic exchange •Environmental biophysics ·Microbial interaction in soil ecosystems ·Behavior of carbon and phosphorous in soils and ecosystems

·Biodiversity and material flow in Japanese ecosystems ·Theoretical and empirical study of methods for phylogenetic estimation from DNA and amino-acid sequence data ·Geometric morphometrics of biological shapes and statistical analysis of shape variation

Cooperative Courses

- Sustainable Agro-ecosystem Engineering ·Development of a fully controlled crop production system
- based on energy-efficient technologies ·Physiological and genetic evaluation of climate change
- effects on horticultural crop production ·Development of safe and comfortable farm work systems ·Survey of agricultural technology history (management of
- agricultural museum) ·Optimization of pre- and post-harvest food chain technolo-
- gies, and QOL improvements for seniors through fusion of medicine, agriculture, and food
- Radio Environmental Technology ·Analysis of agricultural rehabilitation in areas polluted by radioactive materials
- ·Movement explication of radioactive materials in plants and soil
- ·Heterogeneity of radiocesium and stable cesium within the same field
- ·Monitoring inspection for radiocesium in agricultural, livestock, forest, and fishery products in Fukushima Prefecture

Department of Biomaterial Sciences

We consume various kinds of raw materials to better our quality of life. As many of these materials are currently produced from fossil resources, the environmental impact of their excessive consumption is cause for concern. Development and introduction of biomaterials more in harmony with the environment is therefore desirable to facilitate replacement of fossil resources. Wood, the most important biomaterial, is both renewable and clean. Promoting its beneficial utilization will help to preserve the environment and is essential for the continued existence of human beings far into the future. To constructively promote biomaterial utilization, we must strive for efficient and complete wood usage and the application of knowledge and research methods based on material sciences to biomaterials other than wood. The Department is advancing science and technology toward this goal. http://www.fp.a.u-tokvo.ac.ip/graduate/english/



Environmental biodegradation of biodegradable plastics

Structural Biomaterials Science

► Adhesion Science and Bio-Composites ·Relation between chemical structure or physical properties of polymer and adhesive performances ·Surface and Interphase of adhesives ·Penetration of adhesive into wood •New composite from renewable materials

Material and Housing Sciences

Wood Physics ·Physical and mechanical properties of structural biomaterials

·Properties of wood for musical instruments •Timber drying and wood–water relationships ·Evaluation of wooden environments for human comfort ·Analysis of strength decreases in wood from biodegrada-

tion

(shown in green) and adhesive (in red)

Properties of wood for exterior uses

▶ Wood-based Materials and Timber Engineering ·Development of new wood-based materials and processing ·Development of high-strength wooden joints for heavy timber construction

•Evaluation of structural performance of timber construction ·Environmental impact of wooden housing and recycling of wood resources

▶ Bionanomaterials and Cellulose Science ·Preparation of new bio-based nanomaterials from cellulose and chitin through environmentally friendly processes including TEMPO-mediated oxidation ·Efficient surface modification of TEMPO-oxidized cellulose nanofibrils for application in high-tech materials fields

·Self-assembly behavior of bio-nanofibers and their structural Characterization in bulk and nanocomposite materials



Yayoi Auditorium Annex in the campus of the University of Tokyo using HP shells structure with wood-based materials

Biomass Chemistry

- Forest Chemistry
- •Total genome and transcriptome analysis of wood decay fungi
- •Functional and structural analysis of enzymes related to biomass conversion
- •Biotechnology for production of fuel and chemical feedstock from cellulosic biomass
- •Biochemical and genetic analysis of plant cell-wall components and secondary metabolites
- Wood Chemistry

•Chemical structure, reactivity, and function of plant cell-wall components

Pollution-free pulping, bleaching, and biorefinery technology
 Biomass utilization by chemical modification of lignin and carbohydrates

Science of Polymeric Materials
 Chemical and enzymatic syntheses of new bio-based

polymers

High-functionability of biodegradable plasticsProcessing and structure analysis of eco-friendly polymers

Asian Natural Environmental

Science Center

- Sustainable Material Design^{*1}
- ▶ Wood Utilization System^{*2}
- •Economic, environmental and social impact evaluation on utilizing timber and wood products
- ·Timber and wood products marketing
- Policy, education, finance, human resource development and consumer perception for promoting wood utilization
- *1 Cooperative course. The laboratory and its staff belong to the Asian Natural Environmental Science Center.
- *2 Endowed Research Unit. The laboratory and its staff belong to the Asian Natural Environmental Science Center.

Department of Global Agricultural Sciences

The Department of Global Agricultural Sciences (GAS) is committed to serving global society through education and research on sustainable ecosystem services such as foods, fibers, and other bioresources. GAS programs are issue-oriented rather than technology-oriented and are based on a strong combination of expertise across disciplinary and national boundaries. The associated programs offered by professors from institutions outside the university give further breadth to GAS education and research.

Students are advised to join overseas training courses organized by GAS in collaboration with universities and institutes in the country. Students in the Master's program are also encouraged to minor in another department to strengthen their expertise in the pertinent discipline. Students will thus become well prepared to navigate a globalizing and ever-changing world.

http://www.ga.a.u-tokyo.ac.jp/English/

Global Animal Production Sciences

▶ Global Fisheries Science

 Interdisciplinary studies for sustainable fisheries and aquaculture including socioeconomic aspects of small-scale fisheries, consumer markets, food value chains, gender and poverty alleviation.

► Global Animal Resource Science

Epidemiological studies for risk assessment of animal diseases and antimicrobial use in animal production
Epidemiological and parasitological study on fascioliasis
Mucosal immunization to Leishmaniasis in mouse model
Immunopathological study on Newcastle disease virus
Vaccine development to Ascaris suum
Development of edible vaccines



Small-scale fishery Batan Bay, Philippines (Photo by Kamiyama)

Global Plant Production Sciences

- ► Plant Science for Sustainable Agriculture
- Vegetable production system using local plant materials
 Soil structure differences under different cultivation systems
 Sustainable food value chains for ecological agricultural practices
- Improved biodiversity and production diversity in urban agriculture
- Global Plant Material Science
- Recovery and production of value-added products from agricultural wastes
- •Development of functional carbon materials from lignocellulosic resources
- •Aging mechanisms of wood, timber, and other lignocellulosic biomass at the atomic level
- ·Relationship between humans and plant materials



Global Biological

and Environmental Sciences

- Global Forest Environmental Studies
 Monitoring forest environment using satellite remote sensing and GIS
 GNSS utilization in forest area
- •Application of LiDAR and aerial photographs for forest biomass estimation and reconstruction of 3D forest structure
- Plant Biotechnology
 Cellular and molecular analysis of Fe-acquisition mechanisms in plants
 Molecular breeding of stress-tolerant crop plants
 Development of low-Cd plants
 Genetic improvement of plants for production of valuable chemical substances and edible vaccine
- International Agricultural Development Studies
 Modeling studies for optimizing growing conditions of upland NERICA in Africa
- Analysis on the applicability of new phosphorus fertilizer in Burkina Faso using crop growth modeling analysis
 Decision support system for crop nutrition management
 Influence of rice paddy fields on iron dynamics in rivers and the structural features of humic substances in their sediments
- •Influence of freshwater from terrestrial sources on iron concentrations in coastal areas
- •Effective utilization of agricultural waste in Africa for environmental conservation

International Development

and Agro-Environmental Sciences

- International Environmental Economics
 Effects of global warming on world agriculture and forestry
 System modelling to interpret global food supply and demand
- •Economic development and environmental problems in developing countries
- Imperfect competition and roles of cooperatives in agricultural markets and trade
- International Agro-Informatics
 - ·Agriculture and soil information system using ICT/IoT technology
 - •Soil and water conservation in agricultural fields
 - Remediation and renewal of agriculture in Fukushima after nuclear power plant accident
 - Development of farmer-friendly quality evaluation systems for fresh produce
 - •Rural development studies on the distribution of agricultural products
 - •Food engineering analyses in the context of international agricultural development



Balinese rice terrace: Cultural landscape in Bali is registered as a UNESCO world cultural heritage since 2012

Department of Ecosystem Studies

The Department of Ecosystem Studies aims to develop sustainable global management schemes that value ecosystem mechanisms and allow human society and nature to exist in harmony. An important feature of the Department is a focus on fieldwork which is conducted in different ecosystems from forests to coastal environments. Based on an understanding of the mechanisms and existing problems of focal ecosystems, the Department aims to both integrate agricultural and life-science-related academic achievements and develop related principles and techniques while educating skilled professionals. The Department has two main divisions, Biological Conservation and Ecosystem Management, and the two associated divisions of Bioresources Management and Bioresources and Eco-Environmental Studies. The Bioresources Management associated division cooperates with the former two divisions in research and education and is composed of six facilities within the Graduate School of Agricultural and Life Sciences.

http://www.es.a.u-tokyo.ac.jp/english/

Biological Conservation

- Biodiversity Science
 Studies on various aspects of biological diversity, from both
- pure and applied views
- 1) Mechanisms maintaining biodiversity
- 2) Conservation and management of biodiversity
- Conservation Ecology
 - •Studies on the conservation and sustainable use of agricultural ecosystems
 - •Studies on the management of ecosystem services/goods in urban ecosystems
 - •Studies for understanding the structures and dynamics of human-nature interactions

Ecosystem Management

- Landscape Ecology and Planning
- •Landscape ecological studies on global and regional environments, monitoring of changes in natural environments caused by human impact, and ecological land evaluation and its application in landscape and environmental planning
- ▶ Forest Ecosystem Studies
- •Genetic and ecological studies for the conservation of forests and surrounding ecosystems
- Planning sustainable use of forest resources
 Analysis and conservation of tree diversity, forest species interactions, population dynamics of animals and plants, and endangered species conservation



Satoyama, a traditional rural landscape



Riparian forest in Chichibu moun- Meadow steppe in Inner Mongolia, tains, central Japan China

- Aquatic Conservation
- Effects of environmental changes in coastal habitats on fishes and invertebrates
- Assessing restored and natural intertidal flats in a damaged embayed system
- •Production mechanisms in coastal ecosystems based on stable isotope analyses
- ·Life cycles of coastal fishes and invertebrates
- ·Development of strategies for coastal ecosystem conservation

Bioresources Management

- Agricultural Field Ecology^{*1}
- ► Aquatic Bioscience^{*2}
- ► Forest Ecosystem^{*3}
- ► Forest Functional Biology^{*3}
- ▶ Forest and Human Society Relationship^{*3}
- ▶ Forest and Water Resources Management^{*3}

Bioresources and Eco-Environmental Studies

Ecological Safety Studies

*Cooperative Courses. The laboratories and their staff belong to the *1 the Institute for Sustainable Agro-Ecosystem services ,*2 the Fisheries laboratory, and*3 the University of Tokyo Forest.

Department of Animal Resource Sciences

The primary aim of research and education at the Department of Animal Resource Sciences is to maximize the utility of various functions of animals, mainly mammals, by revealing mechanisms underlying diverse and complex life phenomena. To this end, the Department is working to elucidate life phenomena from a variety of perspectives, ranging from molecular biology to ethology. It also aims to improve the productive capability of animals and seeks effective ways to preserve valuable genetic resources by applying state-of-the-art biotechnologies that enable elicitation of the potentiality of animals and animal cells. At the same time, the Department has always placed high priority on fostering the potential of its students. Graduates from the Department occupy important positions not only in the field of animal resource sciences but also other fields including medical and pharmacological sciences.

http://www.ar.a.u-tokyo.ac.jp/pages/English/E_top.html

Bio-regulatory Systems

- Molecular Immunology
- •Studies on molecular mechanisms of immunity against protozoan infection
- •Development of diagnostic, therapeutic, and prophylactic technologies for protozoan diseases
- •Epidemiological studies on visceral leishmaniasis in the Old World
- Applied Genetics
 Reverse-genetic analyses of mechanisms in mammalian

oocyte growth, oocyte maturation, fertilization, and early embryo development

Molecular mechanisms of bi-directional communication between oocytes and surrounding somatic granulosa cells
Studies on animal remodeling by developmental biotechnology using artificial chromatin-targeting enzymes

 Cell Regulation
 Signal transduction of hormones and nutrients, and its modulation under physiological/pathological conditions



Chimeric mouse placenta produced by injection of GFP-positive TS cells



DNA microinjection into mouse zygote



Promastigotes of Leishmania parasites (Giemsa stain)

Functional Bioscience

- Cellular Biochemistry
- Studies on molecular mechanisms underlying growth and differentiation of trophoblast lineage
 Elucidation of the role of genomic DNA methylation in
- epigenetic control of cellular differentiation and mammalian development •Interplay between epigenetic regulation and RNA process-

ing in higher eukaryotes

- Veterinary Ethology
 Chemical communication via pheromones in mammalian species
- •Clinical studies in veterinary behavioral medicine
- Animal Radiology
 Studies on lipid signaling in inflammation (tumor, allergy, and tissue regeneration)





Clinical research on problem behaviors of companion animals

Studies on the pathophysiological effects of low-dose radiation

Cooperative course

- Animal Life Science and Biotechnology^{*1}
 Safety and risk assessment of feeds and animal-derived foods
 - •Studies on the nutritional effects of amino acids in farm animals
- •Studies on reproductive function in farm animals

•Studies on compost using ultra-high-temperature aerobic fermentation

*1 The laboratory and its staff belong to the Animal Resource Science Center.

Department of Veterinary Medical Sciences

Veterinary medicine encompasses a broad area of the life sciences, taking in not only animal medicine but also the biology of mammals and higher vertebrates. In the Department of Veterinary Medical Sciences, highly advanced research is being carried out at the molecular, cellular, and in vivo levels in order to fully understand the vital processes of normal and diseased animals. Veterinary medicine encompasses two aspects of science: basic science to understand the mechanisms underlying biological phenomena, and applied science to satisfy social demands for the maintenance and improvement of human well-being and the productivity of domestic animals. The department collaborates with the Veterinary Medical Center located on the Yayoi campus. The Center is equipped with the latest advanced medical instruments and plays an important role as an advanced veterinary hospital in the area.

http://www.vm.a.u-tokyo.ac.jp/eng/



Joint orientation meeting at the Animal Resource Science Center

Basic Veterinary Medicine

- Theriogenology
- •Mechanisms regulating ovulation and follicular development in female mammals

Pathophysiological mechanisms mediating suppressed gonadal activities under malnutrition
Development of systems stimulating and suppressing

- reproductive function
- Veterinary Anatomy
 Molecular and cellular analyses of mammalian gonadogenesis, testiculogenesis, and spermatogenesis
 Roles of SOX (Sry-related HMG box) genes in mammalian embryogenesis and organogenesis
- Veterinary Physiology
 Regulation of brain function by sex steroids and growth factors

·Regulatory mechanisms involved in growth, regeneration

and aging of skeletal muscle

•Stress responses of the central nervous system to immune challenge

- Veterinary Pharmacology
 Signal transduction in cells and its modification by drugs
 Pharmacological effects of bioactive natural products
- Veterinary Microbiology
 Studies on the mechanisms of persistent infection and
- reactivation of animal viruses and protozoa •Development of recombinant vaccines for animals
- Veterinary Public Health
 Control of zoonotic bacterial and viral pathogens in humans, livestock, and foods
 Ecology and role of bacteria harboring in the intestines of humans and animals
- Food and Physiological Models (Endowed chair)
 Molecular mechanisms of learning and memory
 Elucidation of Insulin/IGF signal transduction

•Establishment of animal models for food and feed additives

Cellular Biochemistry*1

•Studies on molecular mechanisms underlying growth and differentiation of trophoblast lineage

•Elucidation of the role of genomic DNA methylation in epigenetic control of cellular differentiation and mammalian development

 Interplay between epigenetic regulation and RNA processing in higher eukaryotes

 Veterinary Ethology*1
 Chemical communication via pheromones in mammalian species

·Clinical studies in veterinary behavioral medicinee

Molecular Immunology*1
 Immunopathological understanding of the host-parasite

relationship in protozoan diseases •Development of drugs, vaccines, and diagnostics for

parasitic diseases •Ecology and biology of sandflies as the vector of Leish-

mania

▶ Applied Genetics*1

•Reverse-genetic analyses of mechanisms in mammalian oocyte growth, oocyte maturation, fertilization, and early embryo development

 Molecular mechanisms of bidirectional communication between oocytes and surrounding somatic granulosa cells
 Studies on animal remodeling by developmental biotechnology using artificial chromatin-targeting enzymes

Animal Radiology*1

•Studies on the pathophysiological effects of low-dose radiation

•Studies on lipid signaling in inflammation (tumors, allergies,and tissue regeneration)



Staff describe the disease history of an elephant farm in Thailand to students in a practical collaboration with Kasetsart University

Clinical Veterinary Medicine

 Veterinary Pathophysiology and Animal Health
 Study on stress responses of animals from a preventive medicine perspective

•Pathophysiology of cardiorespiratory and autonomic nervous systems using basic research techniques

- Veterinary Pathology
 Comparative neuropathology
 Comparative oncology
 Experimental and toxicologic pathology
- Veterinary Internal Medicine
 Molecular pathogenesis and diagnostics of lymphoid and hematopoietic malignancies
 Pathogenesis of gastrointestinal and liver diseases

•Association of body composition and canine diseases

Veterinary Surgery
 Biological and translational research on tumors in small animals

•Regenerative therapy in veterinary medicine



A horse (Winerscircle; left) at the stock farm of the Animal Resource Science Center, and his Holter electrocardiography recording in the early morning (blue dot, atrio-ventricular block; right)

•Anesthetic, analgesic, and perioperative management in small animals

- Biomedical Science
 Studies on infectious viral diseases in experimental animals
 Establishment and analysis of animal models of disease
- Veterinary Clinical Pathophysiology
 Basic and clinical research of cancer immunotherapy
 Pathophysiology of renal, gastrointestinal, and allergic diseases

•Kidney regeneration using xenotransplantation

Infection Control and Disease Prevention
 Studies on pathogenesis of slow infections including viral cancers

•Studies on pathogen detection methods •Studies on vaccines for controlling infectious diseases

- Veterinary Emergency Medicine
 Regeneration of bone tissue using artificial bone implants
 Development of new treatments for osteoporosis
 Biological effects of trehalose
- Farm Animal Medicine
 Pathophysiologic analysis and development of diagnostic methods of diseases with diagnostic difficulties in cattle
 Studies on onset mechanism of bovine leukemia
- Global Animal Resource Science*²
 Veterinary epidemiology, import risk assessment of animals and animal products, and food-safety risk assessment
 Vaccinology including the mucosal delivery system, edible vaccines, immunogen formulation, and host immunity

Bio-Animal Science

- Animal Life Science and Biotechnology*³
 Safety and risk assessment of animal-derived foods including evaluation of radioactive contamination of livestock and livestock products due to the Fukushima
 Daiichi nuclear power plant accident
- •Studies on regulation of microbial infection by steriliza- tion of compost using ultra-high-temperature aerobic bacterial fermentation
- •Studies on the physiological characteristics of ovaries including research on molecular mechanisms of oocyte selection in mammalian ovaries
- •Studies on the nutritional effects of amino acids on infantile growth in farm animals

Food Safety and Science*4

- Laboratory of Food-borne Pathogenic Microbiology
 Surveillance of virulent Streptococcus suis strains among healthy pigs and retail meat in Japan
- •Functional analysis of cell-wall linked proteins in Streptococcus suis
- ·Development of a new selective medium for Isolation of



Surgery in progress at the Veterinary Medical Center

genus Streptococcus from food and environmental samples •Search for source of Campylobacter infection in broiler chicken houses

Experimental Medicine*5

- Laboratory Animal Research Center
- •Analysis of pathogenicity and species specificity of RNA viruses
- Analysis of mechanisms of RNA-virus persistent infection
 Development of novel treatments for emerging lethal virus infections
- Development of new recombinant vaccines
 Development of recombinant viruses as oncolytic virotherapy agents
- Molecular Virology
- Strategic fundamental research aimed at developing a novel method of viral infection control by elucidating the mechanism underlying viral proliferation/pathology
 Next-generation virology to reconsider viruses as a homeoptication factor and avalance their gignificance in addition to
- ostasis factor and explore their significance, in addition to unraveling cells and physiological control mechanisms that cannot be elucidated by research on normal human hosts, using viruses as a biological probe
- *1 Cooperative course. The laboratory and its staff belong to the Department of Animal Resource Sciences.
- *2 Cooperative course. The laboratory and its staff belong to the Department of Global Agricultural Sciences.
- *3 Cooperative course. The laboratory and its staff belong to the Animal Resource Science Center.
- *4 Cooperative course. The laboratory and its staff belong to the Research Center for Food Safety.
- *5 Cooperative course. The laboratory and its staff belong to the Institute of Medical Science.

Research and Education Programs

Agricultural Bioinformatics Research Unit



The Agricultural Bioinformatics Research Unit was established in 2004 with support from MEXT (Ministry of Education, Culture, Sports, Science and Technology) to conduct education and research on bioinformatics for graduate students who are studying agricultural and life sciences. The Unit's educational program includes lectures, practical education, and seminars in advanced topics of bioinformatics and their agricultural applications. It also supports the research of master's and doctoral students and presents practical education linked directly to each research topic. The Unit aims to become a base of cooperation for experimental and computational studies as well as industryuniversity cooperation. The Agricultural Bioinformatics Research Unit was renewed in 2009 in order to enhance our activities by building upon past experience and to promote university-industry cooperation and international cooperation. So far (2004–2018 academic years), a total of 2017 students have completed the lectures and a total of 227 students have completed this program.

Educational Program

▶ Fundamentals

Introduction to Biological Sequence Analysis
 Introduction to Genome Informatics
 Introduction to Biostatistics
 Introduction to Structural Bioinformatics



Certification graduation ceremony

Methodology

- Knowledge Information Processing
 Sequence Statistics and Mathematical Biology
 Molecular Modeling and Simulation
 Omics Analysis
 Functional Genomics
 Introduction to Systems Biology
 Field Informatics
- Advanced Topics
- •Special Lectures on Agricultural Bioinformatics I •Special Lectures on Agricultural Bioinformatics II •Special Lectures on Agricultural Bioinformatics III •Special Lectures on Agricultural Bioinformatics IV •Research Exercises on Agricultural Bioinformatics

Graduate students can obtain credits by attending these lectures and practical education toward professional certification. Besides these lectures and practices, several seminars and workshops are held every year.

AGRI-COCOON

AGRI-COCOON (AGricultural Research Incubator COmmunity for COOperative Network of Public, Administrative, Business, and Academic Sectors) is a research and educational community established in 2005 at the Graduate School of Agricultural and Life Sciences, the University of Tokyo. The primary mission of AGRI-COCOON is to develop and implement multidisciplinary programs for graduate students. The programs are designed to enable graduate students to conduct original, highly creative, and self-directed research projects by enhancing their skills in terms of:

Information collection
Problem assessment

Academic communication
Knowledge building
Knowledge integration

AGRI-COCOON also contributes to the further advancement and enrichment of the Graduate School through collaborative interactions among academia, business, government, and private institutions. Graduate students of all majors and departments are welcome at AGRI-COCOON's unique multidisciplinary workshops and seminars, with some academic courses open to undergraduate students since 2011.

By building agro-science knowledge and developing a new agricultural research and education protocol, AGRI-COCOON aims to systemize mutual understanding and communications among various stakeholders related to agricultural sciences. Throughout the academic year, AGRI-COCOON hosts many international symposiums and seminars that are open to all students and the general public.



Academic Curriculum

- ▶ Food Science Seminar Series I (for graduate students)
- Food and Human Health Sciences (for undergraduate students)
- Multidisciplinary lectures on food and human health with leading topics in economics, veterinary science, and chemistry
- ▶ Food Science Seminar Series II (for graduate students)
- Seminar on Food and Health Industories and Sciences (for undergraduate students)
- •Discussions with guest lecturers, one-day study trips to factories, testing centers, and/or research institutes
- ► Food Science Seminar Series III
- Internship programs on food safety policy at government organizations
- Seminar for Global Agriculture and Culture

- Intensive lectures on natural and socioeconomic environments in developing countries
- Practices in Global Agriculture and Culture
 Practical training at Japanese farming sites and field trips to developing countries
- Topics in Biomass Utilization Research I/II
 Periodics seminars by UT Faculty members with guest lecturers on leading topics in biomass utilization, and fieldwork at biomass utilization sites in Japan
- Biomass Utilization Research Seminar I/II
 Intensive practical training and fieldwork on biomass utilization
- Biodiversity and Agriculture
 Discussions and fieldwork on biodiversity of agricultural sites
- with local citizens, organizations, and researchers
- Training in Nature-Restoration Operational Monitoring
 Monitoring research of nature-restoration project sites in Japan



Practices in Global Agriculture and Culture: field trip to Lampung, Indonesia

- ► Agro-Informatics Seminar
- Seminars and symposiums on agro-informatics
- Influence of Radioactive Substances in Agriculture (for graduate students)
- Influence of Radioactive Substances in Agriculture and the Environment (for undergraduate students) Multidisciplinary lectures on the problems of radioactive substances attributable to the nuclear accident in Fukushima
- Influence of Radioactive Substances in Forest Ecosystems (for graduate students)

Practical training to monitor and analyze radioactive substances in forest ecosystems

Research and Communication Skills for Scientist Practical training on how to plan and design an experiment, and gain expertise in scientific writing and presentation.

Food Science Seminar: field training at an independent research institute

One Earth Guardians Development Program

The One Earth Guardians Development Program, started in 2017, aims to foster human resources called "One Earth Guardians". The Guardians are a network of scientists who will take actions aimed at securing the future of the Earth for the next 100 years as a place where all living beings, including humans, coexist in harmony.

Since the beginning of human history, we have consumed unsustainable levels of various biological and non-biological resources, and our pursuit of economic efficiency and industrial prosperity has damaged our irreplaceable planet, "One Earth". The planet will not be able to sustain our lives in the near future if we do not take action now!

As individuals devoted to the field of agriculture, which is a combination of academic science and applied science covering various aspects of our daily life, such as food, clothing, housing and more, we are responsible for the establishment of scientific technologies for a sustainable future, by fostering future scientists, as soon as possible.

For the development of such technologies and human resources, the program takes advantage of collaboration with all the components of society, including companies, NPOs, governments, other academic institutions and even people who are not familiar with such global issues, to find and solve environmental and/or social problems happening now or in the future. This research and education program is designed to help us answer the question "What can we do for the Earth in the next 100 years?"



ADMISSION POLICY

- Individuals who have paid attention to the issues the Earth faces and are passionate about solving the issues from a scientific perspective.
- Individuals who are eager to solve global issues as cosmopolitans, with a flexible mind and respect for others.
- Individuals who combine both core specialty expertise and a broad understanding of science, capable of generating scientific synergy among scientists.

CURRICULUM POLICY

Those admitted to the OEGs program will take classes in three categories, each of which is a necessary component to understand multilateral aspects of problems relating to the SDGs and to become One Earth Guardians, i.e., the leaders who drive the whole society toward the realization of the SDGs. Category 1: Basic One Earthology

Classes in this category support basic understanding of biological organisms including animals, plants and microorganisms and how they play important roles in the achievement of the SDGs from the aspect of environment, food security and renewable bioresources.

Category 2: Applied One Earthology I

Classes in this category help OEGs candidates to gain skills in the area of problem defining and problem solving for reality, in order to do 'Agriculture', the applied science for sustainable society and lives.

Category 3: Applied One Earthology II Classes in this category help OEGs candidates to gain skills needed to deliver scientific achievements to global society and in turn bring people together to solve issues relating to the SDGs in collaboration with one another.



International Program in Agricultural Development Studies (IPADS)

"Traditional and innovative" "Wide spectrum of research activities" "Make a difference in the modern, globalized industry of agriculture" "Practical, relevant and challenging"

Inaugurated in the academic year 2010/2011, International Program in Agricultural Development Studies (IPADS) is an English-language MSc and PhD Program at the Graduate School of Agricultural and Life Sciences. Issue-oriented rather than methodology-oriented, this exciting international program offers its candidates the opportunity to develop the requisite expertise across discipline and country boundaries to tackle agricultural and environmental problems in developing countries around the world. Graduates will be well-equipped to make a difference in the modern, globalized industry of agriculture.



The academic year at IPADS begins in September each year. Typically, students in MSc complete the coursework component of the program in their first six months whilst designing and preparing for their original research, and then engage in full-time research for the remaining 18 months. Throughout the program, students are actively involved in the School's research community, participating in weekly seminars, thematic workshops and academic conferences. The professors have excellent academic carrier and wide experiences in international researches. IPADS also offers three-year, research-only PhD program.



IPADS



RESEARCH COMPONENT

The research component of the MSc program and the entire PhD program are conducted under the supervision of one or more of the School's faculty. Students have opportunities to work with suitable members of staff to satisfy their own requirements and research interest among eleven disciplines; Plant Science, Plant Material Science, Plant Biotechnology, Economics, Animal Science, Food Science, Agroinformatics, Forestry, Fisheries, Environmental Science, Ecology

Crop modeling: From theory to practice. Field experience for ZEF students during IPADS visit in spring. Good opportunity for the cultural exchange, too.

ZEF (University of Bonn) and IPADS Joint Coursework Initiative

The Center for Development Research (ZEF) is an institute of the University of Bonn, Germany. ZEF aims to find science-based solutions to development-related issues. IPADS and ZEF have established a strategic partnership in research and education. The exchange of students and professors plays a key role. In the beginning of 2016, two memoranda of understanding were signed: One between the Universities of Bonn and Tokyo and another between IPADS and ZEF.







 IPADS-ZEF Joint Seminar at Yayoi Campus
 Dr.Manfred DENICH from ZEF, University of Bonn giving a lecture to IPADS students
 IPADS-ZEF Joint Seminar at Yayoi Campus

Affiliated Institutions

Institute for Sustainable Agro-ecosystem Services



The Institute for Sustainable Agro-ecosystem Services (ISAS) was founded on April 1, 2010, by integrating the University's Field Production Science Center (University Farm) and the Experimental Station for Landscape Plants. The Institute is also affiliated with the University of Tokyo Tanashi Forest for education and research in forest sciences.

With the integration of these research facilities, the Institute aims to conduct research for sustainable provision of foods, forest products, and other ecosystem services. Our scope also entails robustness and resilience of ecosystem services against natural disasters and human perturbations. The research toward these goals is done by three groups: the Information and Social Science Group, the Agricultural and Forest Ecology Group, and the Agricultural Biology and Biogeochemistry Group. The members of the research groups have diverse academic backgrounds, but work together across disciplines toward common aims. They also collaborate with scientists outside ISAS, especially those at the Graduate School of Agricultural and Life Sciences, the University of Tokyo, to utilize their expertise to achieve the research aims. The ISAS campus is located in Nishitokyo City and has a total area of 22 ha covering upland fields, rice paddies, greenhouses, and other research and education facilities. For more details, you may visit our website (http://www.isas. a.utokyo.ac.jp/index-e.html) or even better, visit our campus personally!



Learning to operate machinery in a field class for undergraduate students

The University of Tokyo Forests

The University of Tokyo Forests (UTF) was established for research and educational purposes in the field of forestry and forest science. The UTF has seven branches in a wide variety of vegetation localities. The total forest area is approximately 32,000 ha.

► The University of Tokyo Chiba Forest (UTCBF): The

University of Tokyo Chiba Forest was established in the southern Boso Peninsula in 1894 as the first university forest in Japan. The forest has an area of 2,169 ha and is located in a warm-temperate forest zone. The area is covered with various tree types. Planted forest consists of *Cryptomeria japonica* and *Chamaecyparis obtusa*. Coniferous natural forest is mainly dominated by *Abies firma* and evergreen *Quercus* spp.

- The University of Tokyo Hokkaido Forest (UTHF): The University of Tokyo Hokkaido Forest, which has an area of 22,717 ha and is located in central Hokkaido, is dominated by boreal coniferous trees mixed with broad-leaved deciduous trees.
- The University of Tokyo Chichibu Forest (UTCF): The University of Tokyo Chichibu Forest has an area of 5,812 ha and is located in Chichibu-Tama-Kai National Park. It is in a cool-temperate zone with mountainous terrain. The vast majority of the UTCF (>85% of the total area) is covered with natural forest. The major tree species are Abies firma, Tsuga sieboldii, Fagus japonica, and Fagus crenata. Of the 28 Acer species in Japan, 20 are found in the UTCF.
- The University of Tokyo Tanashi Forest (UTTF): The University of Tokyo Tanashi Forest is the nearest university forest to the University of Tokyo campus and is approximately 9 ha in area.



 Hands-on learning program for undergraduates to make chocolate using cacao plants grown in the green house (photo by Arboricultural Research Institute)
 Maintenance of Moso bamboo plantation site where mass flowering mechanism has been researched (photo by the University of Tokyo Chiba Forest)



Social experiment of Iyashinomori Research Project: a public auction of firewood (photo by Fuji Iyashinomori Woodland Study Center)

- Ecohydrology Research Institute (ERI): Ecohydrology is an interdisciplinary field studying the interactions between forest and water, and their ecosystem services. The ERI manages the Akazu Research Forest (ARF, 745 ha), the Inuyama Research Forest (IRF, 442 ha), and the Ananomiya Experimental Forest (AEF, 77 ha) for various field researches and educations.
- Fuji Iyashinomori Woodland Study Center (FIWSC): Fuji Iyashinomori Woodland Study Center is 40 ha in area and located on the eastern slope of Mt. Fuji. The area lies on the higher cool-temperate forest zones.
- Arboricultural Research Institute (ARI): The Arboricultural Research Institute is 247 ha in area and located at the southern tip of the Izu Peninsula. It is in a typical warm-temperate forest covered with evergreen tree species. Field adaptation tests have been conducted over several decades to select locally adaptable *Eucalyptus* species. Further screening of candidate species is planned to identify better species in terms of tree growth.
- Education and Research Center (ERC): The Education and Research Center is located on the Yayoi campus of the Graduate School of Agricultural and Life Sciences, the University of Tokyo. Students who belong to the UTF attend weekly seminars related to their research.
- Executive Office (EO): The Executive Office located on the Yayoi campus was established to coordinate the various activities of the seven branch forests and the Education and Research Center. The role of the Office is to coordinate educational, research, public, personnel, financial, and international affairs as well as to promote cooperation between the branches and other organizations.

Animal Resource Science Center

The Animal Resource Science Center, which was established in 1949 as a livestock farm for undergraduate and graduate student instruction, is located in Kasama, Ibaraki Prefecture, 90 km north of the main campus. One professor, one assistant professor, eight technical assistants including a veterinarian and staff with doctoral and master's degrees, two management staff members, and two part-time assistants support teaching and research for veterinary medicine, animal life sciences, and animal biotechnology. Many of the graduate students affiliated to the research unit of animal resource sciences, investigate front-line topics in veterinary, animal and agricultural sciences.

The Center provides education in the form of numerous practical trainings and seminars for undergraduate and graduate students. In addition, many practical seminars on animal life sciences are offered for students at preschools, elementary schools, and junior high schools, and for the general public. The Center also serves as a social educational center for assessing animal food safety.

There are more than 40 pigs and 10 horses at the Center including Criollo horses, a gift from La Plata University, Ar-

gentina, which are employed in animal therapy. Around 30 dairy cattle and 100 native Japanese Shiba goats bred at the Center are used as experimental animals for studies on ruminants' physiological processes. These farm animals are also supplied to many research institutes as experimental animals for veterinary medicine, animal resource sciences, agricultural sciences and medical fields.

Recent research areas of the Center are as follows: 1) evaluation of radioactive contamination of livestock and livestock products due to the Fukushima Daiichi nuclear power plant accident and developmental research for animal husbandry reconstruction; 2) researches on fundamental physiology of mammalian embryos and reproductive organs to improve pregnancy rate in farm animals; 3) studies on the nutritional effects of amino acids on prevention of mastitis in dairy cattle, and on infantile growth and gastric ulcers in farm animals; 4) neuroendocrine control of the reproductive function in pigs and identification of primer pheromones in ruminants; 5) studies on ultra-high-temperature (more than 110°C) fermentation for sterilizing disposal of livestock excretion using aerobic bacterial flora.



Practical exercises for animal resource science



Assessing radioactive contamination of livestock (piglets) and livestock products (cow's milk) due to the Fukushima Daiichi nuclear power plant accident

Veterinary Medical Center

The Veterinary Medical Center (VMC) was established in 1880 and engages in education and research on clinical veterinary medicine. The VMC building is a 4-story and totally 3,000m⁴ building and is equipped with advanced diagnostic imaging systems, such as color doppler ultrasonography, endoscopy/ arthroscopy, computed tomo-graphy (CT), and magnetic resonance imaging (MRI)apparatus. A total of 20,000 animal patients are referred to VMC every year to receive advanced and high-level clinical services.

VMC plays an important role in educating undergraduate students. They receive practical clinical education from the academic staff of VMC as well as bedside education through clinical rotations. In addition, graduate students carry out researches at their affiliated clinical laboratories, utilizing information on diseases specialized to their fields. Current research projects at VMC include neoplastic diseases, various immune-mediated diseases, neurological diseases, hereditary diseases, orthopedic diseases and anesthesia/ analgesia. Recently, collaborative researches with medical schools/medical hospitals, companies, and/or other institutions have been conducted, which may lead to novel techniques and drugs useful for both human and veterinary medicines. These translational researches should be one of the important roles of VMC.

Furthermore, VMC accepts 10 to 15 newly licensed veterinarians for clinical training every year. They work as residents/hospital staff in the clinical services of VMC to obtain advanced knowledge and techniques in small animal practices.

These activities of VMC are designed to satisfy the social demands for the maintenance and improvement of animal and human welfare and to fulfill the requirements for the education and researches in veterinary medicine.



Veterinary Medical Center building



Surgery



Magnetic Resonance Image (MRI) system



The Laboratory is well situated for research and education regarding the genetics, physiology, development, and ecology of marine organisms. The facility can supply seawater as well as fresh water to more than 100 tanks and ponds of various sizes, ranging from 1 to 100 m³. Moreover, state-of-theart instruments for use in genomics, genetics, imaging, cell biology, and biochemistry enable researchers to study marine organisms at the molecular level. Currently, as part of our main research focus, we are investigating the genetic basis of phenotypic evolution of aquatic animals in order to help make fisheries and aquaculture sustainable. In the past few years, we have been making a strong effort to understand the genetic and immunological aspects of the fugu or pufferfish, the genome of which was the second vertebrate genome to be sequenced. The Fisheries Laboratory accepts both undergraduate and postgraduate students, including those from overseas.



Practical training for undergraduate students



Fugu chromosomes

Isotope Facility for Agricultural Education and Research

The Isotope Facility for Agricultural Education and Research (Isotope Facility) in the Graduate School of Agricultural and Life Sciences was reorganized in 2017. The use of isotope tracers in agricultural research began in the 1950s, mainly in the fields of plant nutrition and fisheries. Nowadays, laboratories that use isotopes are spread throughout all departments in the graduate school, and approximately 300 people annually resister to use the Isotope Facility. To support the research activities, plant growth chambers, safety cabinet system, cryostat, analytical instruments such as GC-MS and SEM-EDX, as well as radiation measuring instruments such as Nal scintillation counters and imaging plates with image readers are equipped. Since 2011, more than 60,000 samples containing radiocaesium derived from the Fukushima Dai-ichi Nuclear Power Plant accident have been measured in the isotope facility.



Radioactivity measuring room

Following strict regulations concerning radioisotope usage in Japan, the administrative office (located within the Isotope Facility) provides a radiation safety program for users, and all isotope users must be registered. All users are also required to attend two different lectures, which are provided by the University of Tokyo and the Graduate School of Agricultural and Life Sciences, respectively. Health checks and radiation exposure monitoring are also performed, and each user must have ID to enter the facility; administrative records are kept of the time users spend in the facility. There are several members of the academic staff at the Facility who, through their research and training, can advise researchers on how to use radioisotopes and provide new information about the application of radiation and radioisotopes.



Environmental samples contaminated by the Fukushima Daiichi Nuclear Power Plant accident



Academic staffs

Entrance to the Radioisotope Center

Technology Advancement Center

Main facilities

Biotron

As environmental conditions in agricultural field experiments are frequently affected by natural climate conditions, the accuracy and reproducibility of experimental data are occasionally limited. Such problems can be resolved to a certain extent by the use of the Biotron facility, where environmental conditions are kept constant and controlled year-round and different conditions can be set at the same time for comparative experiments. Laboratory animals, insects, and aquatic organisms as well as plants can be bred in our Biotron. The conditions of each room of the Biotron facility are as follows: •Bldg. No. 6

Chamber (for insects) 20-35°C
Rooms G1–G4 (natural light) 20-30°C
M (machine room)
Bldg. No. 7 (A) rooftop
Room G1 (natural light) D30-N25°C
G2 (natural light) 20°C (constant)
G3 (natural light) D25-N20°C
M1 (machine room)
M2 (for managing)
Bldg. No. 7 (B) rooftop
Rooms G1-G3 (natural light) 20-35°C
M1 (machine room)
M2 (for managing)
Life Sciences Research Bldg.
Rooms G1-G3 (natural light) 20-35°C





Koishikawa Arboretum

Koishikawa Arboretum occupies about 0.6 ha of the northwest part of the Koishikawa Botanical Gardens, which belongs to the Graduate School of Science, the University of Tokyo. As an experimental nursery, since 1909 the Arboretum has provided plant materials for research on physiology, pathology, genetics, and breeding of plants. A rhizotron constructed in 2003 has provided valuable

facilities for researchers and students studying symbiotic relationships between trees and fungi.



Research Center for Food Safety

The Research Center for Food Safety was established in November 2006 to meet the expectations and need for the development of food safety science and technology. The Center aims to conduct comprehensive research on food safety and dissemination of scientific information through close collaboration with national and international organizations.

The Center is devoted not only to research activities but also to providing scientific information to the public and government and private sectors. The Center also aims to develop leaders with high levels of knowledge and skills by training students, researchers, and government officials from Asian and other countries.

The Center is composed of four divisions, with representative research activities as follows:

Division of Radiological Sciences

Analysis of radioactive substances in foods
Biological effects of radioactivity, including on the genome and epigenome

Division of Risk Assessment Science

•Risk assessment and control of bacterial pathogens in foods

 Prevention of health problems caused by food contaminants
 Pathological, toxicological, and pathophysiological studies of the mechanisms of health problems caused by food contaminants

Development of evaluation systems of food-related effects using experimental animals

·Development of analytical methods for food contaminants

Division of Risk Control Science

•Control of intestinal immune response and food allergies •Maintenance and improvement of healthy livestock to provide food safety

·Development of functional foods and low-risk foods





Experiments using cultured cells at the Laboratory of Immune Regulation





Analytical experiments at the Laboratory of Food Functionality Science

b Division of Information Science and Economics

Policies and economic issues relating to food safety
Risk perception and risk communication relating to food safety

•Training and education of researchers, administrators, and other professionals in the field of food safety

These research activities of the Center are expected to promote the development of innovative science and technology for the advancement of food safety and contribute to fostering experts capable of dealing with food safety issues based on the most current knowledge in these fields.

University Library for Agricultural and Life Sciences

The Faculty has its own library, which was established in 1965 with donations from alumni and the aid of the Rockefeller Foundation. Former libraries of the various departments were then consolidated into one library. The Library contains 440,000 volume of books and periodicals dealing with agricultural and other natural sciences. Currently about 1,700 periodical titles are received.

In 1977, the Library was designated by the Ministry of Education, Science and Culture (currently the Ministry of Education, Culture, Sports, Science and Technology) as the central library for foreign agricultural periodicals and functions as such by collecting foreign periodicals that are difficult to find in Japan and providing services to affiliates of other institutions.



Main building

In July 2009, the main building was reopened after seismic retrofitting.



Browsing Corner (2nd floor)

PC Room (3rd floor)

Overseas Research Center

Center for Biodiversity and Ecosystem Restoration in Mongolia

In response to threats posed by declining biodiversity from climate change and desertification, the Center for Biodiversity and Ecosystem Restoration in Mongolia was established at the Mongolian University of Life Sciences (formerly Mongolian State University of Agriculture) in 2003 as part of the Biodiversity and Ecosystem Restoration Research Project, a 21st Century COE Program headed by Professor Izumi Washitani of the Graduate School of Agricultural and Life Sciences, the University of Tokyo. This collaborative research continued even after the five-year program finished, and it was handed over to the Asian Conservation Ecology as Basis of Symbiotic Society, a Global COE Program, in 2008.

Mongolia has a harsh continental climate with high annual and diurnal temperature fluctuations and low levels of intermittent rainfall, which makes the ecosystem in the region very sensitive to climate change and anthropogenic disturbances. Moreover, political transition at the beginning of the 1990s in Mongolia, followed by livestock privatization and declines in infrastructure, caused a rapid increase in the concentration of livestock, which has resulted in land degradation. The missions of the Center are to understand such vulnerable arid ecosystems



Mongolian and Japanese students conducting joint field work in semi-desert grassland

in relation to human activities, to effectively conserve grassland ecosystems, and to provide appropriate pasture management strategies to sustain ecosystem functions for future generations by taking the initiative in international and interdisciplinary research through exchanges of researchers, lecturers, and students, collaborative research, and holding lectures and symposiums.



Local professors, researchers, and staff at the Center

Related Research Centers

Biotechnology Research Center

The Biotechnology Research Center is a University-wide center and plays a leading role in educational and research activities in biotechnology. The mission of the Biotechnology Research Center is to solve the problems associated with food shortage, environmental pollution, natural resource depletion, and human health, by utilizing plant and microbial biotechnology. All staff in the Center also participate in educational courses for graduate students in the Department of Biotechnology, Graduate School of Agricultural and Life Sciences. In addition, the Center supports researchers in other departments of the University by providing consultation and use of its facilities.

The Center was established as the Biotechnology Research Facilities in the Faculty of Agriculture, the University of Tokyo, in 1984. After several re-organizations, the Center currently has three core research divisions, Environmental Biochemistry, Cell Biology, and Plant Functional Biotechnology, two endowed research units, and three outside collaborative units.

<Core Divisions>

Laboratory of Environmental Biochemistry

The main focus of the research activities in this laboratory are as follows:

 Analysis of novel metabolic capacities of bacteria for xenobiotics and their application to archive effective bioremediation of environmental pollution (Fig.1). 2) The elucidation of signal transduction pathways leading to activation of disease resistance in rice and their application in the development of agrochemicals conferring plant disease-resistance and rice cultivars resistant to pathogens.

Laboratory of Cell Biotechnology

The goal of the research in this laboratory is to understand the mechanistic principles and evolution underlying the biosynthesis of amino acids, cofactors, and biologically active natural products in microorganisms. Rapid change in metabolic flux responsive to environmental change is also one of our targets to study. The laboratory uses a variety of techniques to solve these problems including molecular biology, spectroscopy, enzymology, directed evolution, synthetic biology, and X-ray crystallography (Fig.2).

Laboratory of Plant Functional Biotechnology

This laboratory is studying molecular mechanisms underlying regulation of gene expression associated with nutrient assimilation pathways and signal transduction of nutrient signals in plants. Plant transcription factors are a focus of particular interest (Fig.3). The "omics" approaches, including functional genomics, proteomics, metabolomics, and phonemics, are employed to identify new mechanisms. This laboratory is also studying plant interaction with symbiotic microorganisms and the effects of rhizospheric microorganisms on plant growth.



<Endowed Research Units>

Laboratory of Microbial Metabolomics

This laboratory focuses on protein acylation in bacteria and investigates its biological functions and applications for metabolic regulation with proteomic, molecular biological, and structural biological approaches.

Laboratory of Microbial Membrane Transport Engineering

Membrane transport is important for the efflux of compounds synthesized in microbial cells. It is also essential for producing energy through respiration and photosynthesis.We investigate microbal channels and transporters using a unique microbial patch-clamp system developed in our laboratory and aim to improve the productivity of microbial cell factories through membrane transport engineering.

<Collaborative Units>

Laboratory of Microbial Ecology

It is well known that the behaviors of microorganisms are quite different under laboratory conditions. This Laboratory focuses on the elucidation of microbial behavior and functions in the natural environment, especially under oligotrophic and biofilm conditions.

Laboratory of Synthetic Biology

This laboratory aims to develop technologies for cloning biosynthetic gene clusters of bioactive natural products and for efficient production of them in genetically engineered microorganisms. Such technologies will enable the stable supply of bioactive compounds that could become leads in the development of new drugs.

Laboratory of

Plant production systems engineering

The purpose of this research group is to elucidate mechanisms controlling plant productivity and development of innovative technology to improve plant productivity. This research group is currently engaged in investigation of plant-pathogen interactions and the nutrient-phytohormone interaction network.



Fig.1 Interaction between the IncP-7 carbazole-degradative plasmid, pCAR1, and the P. putida KT2440 chromosome detected by transcriptome and biochemical analyses. Such interactions are indispensable for the effective expression of plasmid function in host bacterial cells and are key determinants of host phenotype and fate under environmental conditions.



Fig.2 Reaction mechanism for the formation of cyclooctat-9-en-7-ol from GGDP catalyzed by terpene cyclase CotB2



Fig.3 The purpose of this research group is to elucidate mechanisms controlling plant productivity and development of innovative technology to improve plant productivity. This research group is currently engaged in investigation of plant-pathogen interactions and the nutrient-phyto-hormone interaction network.

Asian Natural Environmental Science Center

To achieve environmentally sustainable biological production, it is necessary to have a methodology that supports reasonable and feasible land use, as well as the efficient utilization of bioresources. At the same time, developing low-input technology for biological production is also required. These goals can best be achieved through the establishment of a new academic discipline that combines basic science and applied technology with the active implementation of international joint research.

The mission of ANESC is to establish such a foundation for sustainable biological production. Our aim is to achieve this through an integrated understanding of the continuum from forest to cropland and coastal ecosystems, while relating each ecosystem to its specific local environment and community. Our primary focus is on the Asian region where environmental problems are prominent due to the high utilization of bioresources. Moreover, ANESC promotes both advanced laboratory work and field work in cooperation with researchers and research institutes throughout Asia in order to conduct basic interdisciplinary research, with the goal of establishing new methods in field science that can serve as a focal point for the bioresources and environmental sciences in Asia

ANESC is comprised of two fundamental divisions, the Division of Bio-Environmental Assessment and the Division of Biological Resources Development, both of which are staffed by tenured faculty. In addition, the Center includes the Interorganizational Collaboration Division of Resources and Environmental Management, staffed by adjunct faculty from international research institutes, and the Campus-wide Collaboration Division for Creative Research, staffed by tenured faculty of the university. One new research unit, the Wood





Transplanting of traditional and improved rice varieties for a participatory experiment in Cambodia

Alkaline soil area in northeast China, where desertification is in progress



Planting trial for environmental reforestation in acid sulfate soils in Thailand

Utilization System, was created in 2016 based on an endowment from The Norinchukin Bank. Tenured faculty, leading their own independent research laboratories, are involved in the education of graduate students in the Graduate School of Agricultural and Life Sciences, and they also supervise araduate students and post-doctoral fellows.

Division of Bio-Environmental Assessment

- Laboratory of Sustainable Material Design
- Laboratory of Coastal Marine Environment Assessment
 Laboratory of Regional Resources Reassessment
- Division of Biological Resources Development Laboratory of Tree Physiology and Tropical Silviculture
- Laboratory of Environmental Stress Tolerance Mechanisms
 Laboratory of Forest Symbiology
- Laboratory of Tree Environmental Physiology

► Laboratory of Genomics of Plant Resources Interorganizational Collaboration Division of Resources and Environmental Management

Campus-wide Collaboration Division for Creative Research Endowed Research Unit of Wood Utilization System

To fulfill the mission of ANESC, the Center staff promotes the following international joint research programs in cooperation with researchers from other Asian countries: 1) environmental rehabilitation, aiming at the development of methods for

restoring ecosystem function and increasing biological productivity applicable for the rehabilitation of degraded lands by utilizing stress-tolerant plants and symbiotic microorganisms, 2) solutions for global environmental problems, aiming at the development of basic technologies for sustainable land use and bioresource utilization as effective measures to mitigate climate change risks and conserve biodiversity, 3) regional resource utilization, aiming at the development of effective systems of regional resource utilization suitable and applicable in terms of socioeconomic and natural environments for sustainable development of local communities, and 4) genetic resource development, aiming at the exploration of useful genetic resources and the development of effective utilization methods for them to achieve sustainable biological production providing superior efficacy in terms of environmental restoration and conservation.

ANESC aims not only to be a research center for Asian bioresources and the environment at the University of Tokyo, but also to serve as a focal point for research activities designed to harmonize the utilization of biological resources and environmental conservation throughout Asia. Therefore, the ANESC staff regularly visit Asian regions to collaborate with local researchers and tackle serious local problems. Fourty-one research institutes located in Asian and other countries are involved in international joint research activities.





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