

T H E WISE Magazine



Spring in Koganei campus
小金井キャンパスの春



Group work during COVID-19
COVID-19 中のグループワーク



Innovation and Social Implementation イノベーションと社会実装

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It is said that technological innovation will be accomplished through social implementation. The Tokyo University of Agriculture and Technology WISE program (Doctoral Program for World-leading Innovative & Smart Education) emphasizes this process. Therefore, the creation of new industries is one of the objectives of the educational program. In order to form a mindset for new industry creation, there are several lectures for experience-based learning in TUAT WISE program. Not only the lectures, but also several projects are prepared to develop the ability as an excellent leader. One of the projects is the practice of proposal-based research funding acquisition. You will explain the impact on society while overlooking the research you want to implement and to get research fund. You are able to accumulate success stories, through these experience-based learning projects.

技術イノベーションは社会実装で完結すると言われています。東京農工大学の卓越大学院プログラムはこのプロセスを重要視しています。東京農工大学の卓越大学院プログラムはこのプロセスを重要視しています。よって、新産業創出が教育プログラムの一つの目的となっています。新産業を創出したいというマインドを育てるために、この教育プログラムではいくつかの体験型講義が実践されています。講義以外でもリーダーとして活躍するための能力を養えるプロジェクトが複数準備されています。その一つがプロポーザル型の研究費獲得の実践です。自分が実践したい研究を俯瞰しながら、社会に対するインパクトを説明し、必要な研究費を確保するのが目的です。これらの体験型講義を通じて、成功体験を積み重ねましょう。

Qualifying examination 1 (QE1) was conducted in FY2020. QE1 is the midpoint of this TUAT WISE program and a boost gate for the future. In QE1, not only classroom evaluation but performance, competency, and goal/plan were evaluated as well as classroom evaluation. In particular, the students were evaluated on whether they had studied with the mindset to become excellent leaders as knowledge professionals in the future and on whether they were able to imagine their future research and career plans. The FY2020 QE1 candidates seem to have acquired a wide variety of skills through discussions with peers in different research fields in this TUAT WISE program. The faculty members feel that the WISE program students are growing as excellent researchers through various experiences. COVID-19 is influencing the content of the TUAT WISE program, but let us draw the future with wisdom.

2020年度にはQE1を実施しました。QE1はこの教育プログラムの中間地点で、今後の飛躍のための一つのブースト・ゲートです。QE1では、通常の授業評価だけでなく、実績評価、コンピテンシー評価、目標・計画評価が評価されました。特に、将来知のプロフェッショナルとしての卓越リーダーとなるべく意識を持って学んできているかが評価されました。2020年度のQE1受験者はこの教育プログラムを通じて、分野が異なる仲間と議論することで、多彩な能力を身につけたようです。我々教員も卓越大学院履修者が様々な体験を通じて研究者としてたくましく成長していることを実感しています。COVID-19が教育プログラムの内容にも影響を及ぼしていますが、知恵を絞りながら未来を描きましょう。



Proposal-Based Project プロポーザル型プロジェクト

In the WISE Program, we are aiming for promoting innovation by grasping research trends in Japan and overseas, and also by positioning individual research in a more cross-cutting perspective. For this promotion, each WISE student must be able to make new proposals based on their own activities and research themes. Especially, we expect the WISE students to learn how to proceed projects by voluntarily plan the research, write the proposal, implement the applied project, and report the outcome as one flow. Under such purpose, we call for the application for the proposed-based projects with the maximum budget is 500,000 yen.

卓越大学院プログラムでは、個々の研究の専門領域のみならず、国内外の関連分野、企業や社会における研究の動向などを把握すること、および個別の研究をより横断的な視野に位置付けることで、イノベーション推進を進めることを目指しています。そのためには、プログラム生のそれぞれが、各自の活動や研究のテーマに則し、新たな企画提案を行えることが必要となります。とくに、自主的に研究の計画を行い、申請書を作成することから始まり、申請課題を実施し、報告する一連の流れを、実際に行うことで、各自のプロジェクトの進め方を学びます。このような目的のもと、予算50万円を上限とする提案型事業の募集を行っています。

Approved projects in 2020

2020年に承認されたプロジェクト

#	Project Title プロジェクトタイトル	Affiliation 所属 (*)	School Year 学年
1	災害時の生活用水確保を目的とした花崗岩山地流域における広域水流出評価と簡易流量観測センサの開発	A	M1
2	AI画像認識技術を利用したウシ着床前胚の自動トラッキング	A	M1
3	LAI・土壌水分量のデータ同化による作物生産量予測の高精度化に関する研究	A	M1
4	環境保全型農業に適した水稻の遺伝資源及び有用形質とその遺伝子の探索	A	M1
5	福祉的飼育システムが採卵鶏に及ぼす影響のオミクス解析	A	M1
6	Isolation of electricity producing microorganisms for the development of plant-microbe battery	B	M1
7	前立腺癌の骨形成メカニズムの解明にむけた研究	E	M1
8	プロスタグランジンを用いた骨形成促進機構の解明	E	M1
9	梯子状π共役分子を基盤とする新規有機半導体材料の創製と評価	E	M1
10	深層学習によるドローン撮影画像を用いたイネ生育パラメータの汎用的推定モデル構築	A	M2
11	交雑育種とゲノム編集による多用途・高付加価値イネ新品種の育成	A	M2
12	Effect of lignin addition on Polycarbonate— based composites Li electrolytes	AS	M2
13	磁性ナノ粒子を用いた生体分子合成プロセスの開発	AS	M2
14	ソーラークーリングに応用する非追尾型3次元集光器の設計と性能評価	AS	M2
15	機能化シルクフィブロインを基盤とする新規創傷被覆材の創製	E	M2
16	ペプチドによるリポソームの変形制御	E	M2
17	Cardiovascular Bioengineering: In Vitro and In Vivo Evaluation of Decellularized Porcine Pericardium for Cardiovascular Reconstruction	A	D1
18	Molecular characterization of mycovirus-infected isolates of Magnaporthe oryzae and analysis of its pathogenicity	A	D1
19	Concurrent Control of Thymus serpyllum growth and Colletotrichum gloeosporioides Richness by Optimized Trampling	AS	D1
20	Prediction of the optimal harvest day of blueberry based on image processing and machine learning	AS	D1
21	Improving the efficiency of domestic cocoa market by the use of Information technology with focus on the relationship between License Buying Companies and cocoa farmers in Ghana.	AS	D1
22	Developing network relations among diverse sectors: an initial step for preparing the establishment of future Startup company related to sediment disaster countermeasure	AS	D1
23	近年の地震災害事例から、これからの防災・減災を見出す ～「自然現象の場」と「暮らしの場」の知見を繋ぐワークショップの開催～	AS	D1
24	Data Annotation Approach to Big Data Labelling Using Brain-Computer Interfaces	E	D1
25	Cyborg insect for agricultural applications	E	D1
26	植物電池を電源とするエネルギー自給自足型IoTデバイスの開発	E	D1
27	気体原子と固体間でのスピン移行	E	D1
28	新たな母液除去手法を導入した高純度な結晶粒子群製造法の開発	E	D1
29	熱帯半乾燥地におけるバイオ炭と有機資材を用いた土壌劣化防止の適用性と最適化の検討	AS	D2
30	パチルス属芽胞バイオ肥料の作用メカニズムの解明とその社会実装のためのシステムの提言	AS	D2
31	エンドウ萎凋病菌の発生圃場のモニタリングとその発生予測モデルの確立	AS	D2
32	次世代の「緑の革命」を起こす新しいイネの草型の解明	AS	D2

(*) A: Graduate School of Agriculture - 農学府

AS: United Graduate School of Agricultural Science - 連合農学研究科

B: Graduate School of Bio-Applications and Systems Engineering - 生物システム応用科学府

E: Graduate School of Engineering - 工学府

Diversity – From knowledge to action ダイバーシティー知識から行動へ

Understanding of diversity and actions as leaders to make use of it are required for human resources who will lead the global society. In required courses "Diversity Communication" and "Diversity Business Management", we invited astrophysicist, business people, and experts in communication skills to deepen the students' understanding of diversity and acquire skills to transfer it to action through lectures and active learning.

グローバル社会を牽引する人材には、ダイバーシティの理解と、それを活かすリーダーとしての行動が求められます。必須科目の「ダイバーシティコミュニケーション」および「ダイバーシティビジネスマネジメント」では、宇宙物理学者、企業人、コミュニケーション・スキルの専門家等を招き、講義とアクティブラーニングを通じて、理解の深化と行動のためのスキル獲得を目指しています。



伊藤義博先生
電通ダイバーシティ・ラボ
Yoshihiro ITO
Dentsu Diversity Lab



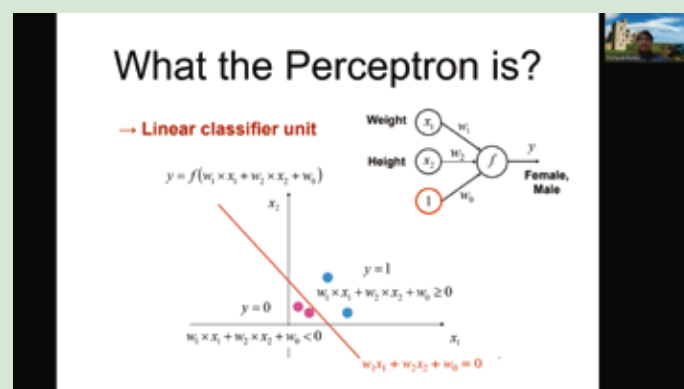
磯部洋明先生
京都市立芸術大学
Hiroaki ISOBE
Kyoto City University of Arts



Data Science – A gateway to society 5.0 データサイエンスーSociety5.0へのゲートウェイ

The outline and practice of data science courses took students one step closer to becoming a data scientist: what data science is and what data scientists do. Students discovered the applicability of data science across fields, and learned how to make data-driven decisions. Through the hybrid lectures (onsite and online), we aimed to give students the foundation needed for more advanced learning to support their career goals.

データサイエンス講座の概要と実践で、データサイエンティストに一步近づきました。データサイエンスとは、データサイエンティストは何をするのか。学生は、分野を超えたデータサイエンスの適用可能性を発見し、データに基づいた意思決定を行う方法を学びました。ハイブリッド講義（オンサイトとオンライン）を通じて、学生のキャリア目標をサポートするために、より高度な学習に必要な基盤を提供することを目指しました。



Seminar for Creation of New Industries – Change your mindset 新産業創出セミナー—マインドセットの転換

For the Seminar for Creation of New Industries which has newly been offered in AY 2020, a lecturer was sent from TOKYO Sogyo Station TAMA (as below). Students could get new ideas which change their mindset, such as "not offering self-satisfaction but customer's satisfaction", "prioritization of customer's perspective to company's logic", and that "customer's voice does not always reflect customer's real perspective". Among others, the lecturer emphasized that young people have advantages because they can utilize experience as a lesson and can still retry even they fail. Therefore, WISE Students are encouraged to generate new industries in the future. In the class, students once took a role as a chief marketing officer and a chief financial officer to make comments on other student's business plan, which was really worth listening.

2020年度に初めて開講した「新産業創出セミナー」では、TOKYO創業ステーションTAMA（下記）に講師の方を派遣して頂きました。自己満足の提供ではなく顧客満足の提供、企業論理ではなく顧客



視点、「お客様の声」は顧客視点とは限らないことなど、新産業創出にかかるマインドセットが転換されるような、様々な考え方を得ることができました。中でも、若い人は失敗経験を教訓として活用できるので有利、というお話があり、卓越生の将来的な新事業創出に期待が持てました。受講生同士でPR役と金融機関役になり、お互いのビジネスプランを評価し合うセッションは大変聞きごたえがありました。

Outline of Life Science – Food and health 生活科学概論—食と健康



With the cooperation of Jissen Women's University, we gave online lectures on nutrition and diseases, as well as visited the production sites in Hino City that support food. Students could gain a better understanding of urban agriculture, find relationships and challenges of food, region and health, and seek possible solutions.

実践女子大学のご協力の下、栄養と疾患に関するリモート講義、および食を支えている日野市の生産現場の訪問を行いました。都市農業に関して理解を深め、食、地域、健康の関連性ならびに課題を発見し、その解決方法について考えることができました。

TOKYO Sogyo Station TAMA - TOKYO創業ステーションTAMA

TOKYO Sogyo Station TAMA is a startup support center operated by the Tokyo Metropolitan Small and Medium Enterprise Support Center, which opened in Tachikawa in July 2020 to support entrepreneurs through various seminars and individual consultations. They have kindly cooperated with our WISE program by dispatching lecturers and providing practical instructions.

TOKYO創業ステーションTAMAは、(公財)東京都中小企業振興公社が運営する創業支援拠点で、2020年7月に立川に開設され、各種セミナーや個別相談を通じて起業支援を行っています。本プログラムでも複数の講師の派遣や実践的指導でご協力いただいています。





Tohoku University - TUAT WISE Joint Workshop 2020

人と自然の相互関係からみた災害とその対策

Disasters and Their Countermeasures from the Perspectives of the Interrelationship Between Human and Nature

STUDENTS ARE ORGANIZERS

This joint workshop is a collaboration project between the WISE programs of Tohoku University (TU-WISE) and Tokyo University of Agriculture and Technology (TUAT-WISE). All the events were organized onsite and online by students from both universities: Yohei Arata (project leader), Ryu Sato, Chinatsu Ukawa, and Liu Zitong from the TUAT WISE; Ayame Sakonaka and Mingjin Jiang from the TU WISE. The workshop attracted 50 attendances with a various range of specialties such as hydrology, geology, remote sensing, crop science, behavioral psychology, and regional planning. Besides the student speakers from two sides, we also had Mr. Kenta Koyanagi (Public Works Research Institute) and Mr. Taku Shiono (KPMG Consulting Japan Inc.) as keynote speakers.

2020年12月18日(金)に、東京農工大学府中キャンパスにおいて、オンサイトとオンライン中継・配信で、ワークショップを開催しました。このワークショップは、東京農工大学卓越大学院プログラムの「プロポーザル型プロジェクト」の一環として、東北大学変動地球共生学卓越大学院プログラムと協働で企画されました。学生主導で企画・運営し、農工大WISEから荒田洋平(運営代表)と佐藤龍、宇川千夏、劉姿彤、および東北大WISEから迫中あやめと蔣明晋の計6名の学生が携わりました。当日は、約50名に参加して頂き、参加者の専門は水文学や地学、リモートセンシング学、作物学、行動心理学、地域計画学など多岐にわたりました。発表者は、両大学の卓越生を中心に招待し、小柳賢太氏(国立研究開発法人土木研究所)と塩野拓氏(KPMGコンサルティング・ジャパン株式会社)が基調講演を行いました。



Project leader Yohei ARATA
運営代表 荒田洋平

KEY TOPIC: DISASTER RISK REDUCTION

Among various discussions, we focused on the future directions for research in Disaster Risk Reduction. Particularly, we aimed to understand the research issues related to disasters in various academic fields and share them with researchers in other fields. The main subtopics of discussion were (1) the gap in interpretation of research data between researchers and policymakers, (2) the various hazards associated with the unique natural environment in Japan, (3) the existence of multiple hazards affecting crop production, and (4) the development of technologies to maximize the power of nature. Overall, with "Multiple" as a keyword, we emphasized the need for collaborating with researchers in various fields to identify the characteristics of disaster risks.

本ワークショップでは複雑化する災害リスクの軽減に向け、今後、私たちがどのような方向性を持って研究するべきかについて検討しました。この検討に向け、様々な学術領域の災害に関する研究課題を理解し、他分野の研究者と共有することを目的としました。当日は、(1)研究者と政策者間の調査データに対する解釈のギャップ、(2)日本特有の自然環境がもたらす多様なハザード、(3)作物生産維持に対する複数ハザードの存在、(4)自然の力を最大限に引き出す技術開発が主な話題となりました。全体としては、今後は“複合”をキーワードに、各分野の研究者が連携し、災害リスクの特徴を見極めていく必要性が強調されました。



TUAT - Fuchu Venue
東京農工大学 府中会場



TU - Aobayama Venue
東北大学 青葉山会場

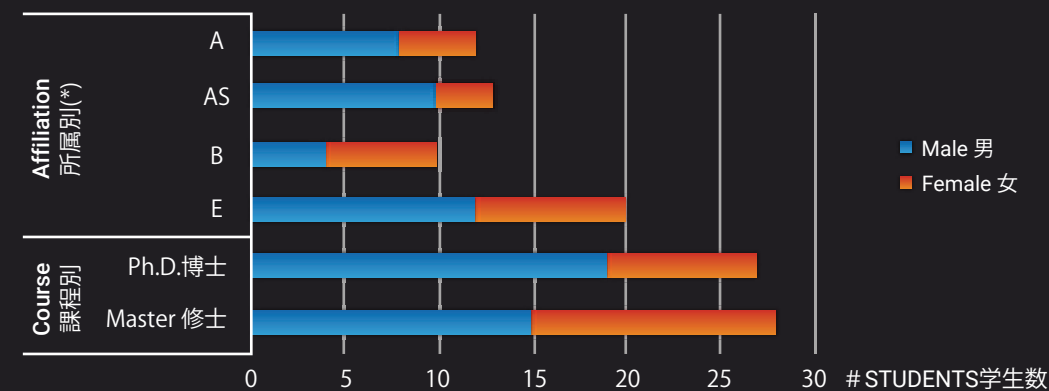
WISE Student Seminar

The WISE student seminar is a series of seminars where WISE students are the main speakers. The seminar is a student's playground to exchange various informative presentations covering their own research and activities. It also provides a valuable opportunity for students to practice English and share their training, workshops and internship experiences not only in Japan but around the world.

卓越学生セミナーは、卓越学生がメインスピーカーとなる一連のセミナーです。本セミナーは学生の自由な情報発信の場であり、自分の研究や活動に関連するプレゼンテーションをお互いに英語で発表し合います。日本だけでなく世界中でトレーニング、ワークショップ、インターンシップを受けた経験を共有する、貴重な機会を提供しています。



Participation status of WISE students



WISE students by courses, affiliation, and gender (as of March 2021)
コース、所属、性別ごとの卓越学生 (2021年3月現在)

(*) A: Graduate School of Agriculture - 農学府

AS: United Graduate School of Agricultural Science - 連合農学研究科

B: Graduate School of Bio-Applications and Systems Engineering - 生物システム応用科学府

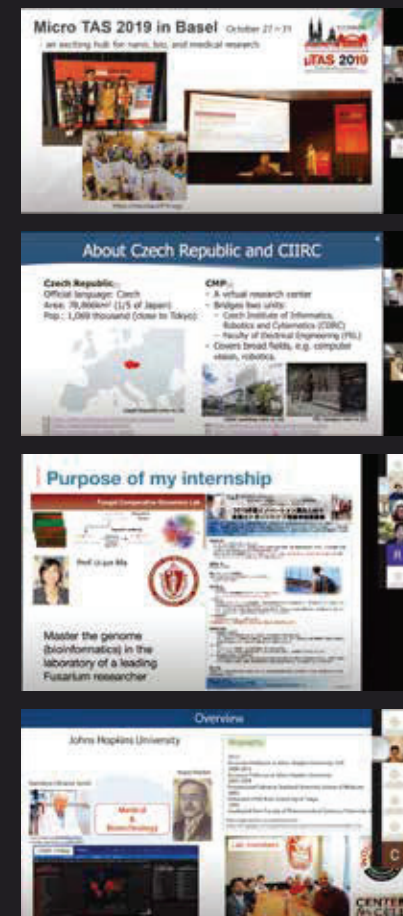
E: Graduate School of Engineering - 工学府

I was in charge of courses such as "Seminar for Creation of New Industries" and "Outline of Life Science". Although there is some limitation due to COVID-19, face-to-face seminar and farm visit, as well as classes and interviews online, made me feel the main characteristics of WISE Program, that is, new industry creation and diversity.

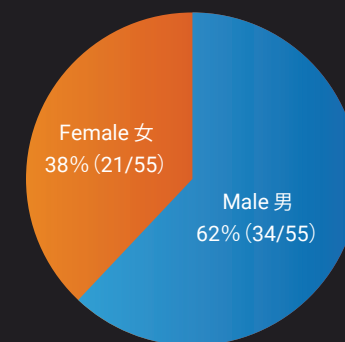
「新産業創出セミナー」や「生活科学概論」などを担当しました。コロナの影響で制限がありましたが、対面のセミナーや農家訪問、またオンライン上の授業や面談において、新産業創出・ダイバーシティという卓越の特色を存分に感じることができました。

Seiko KANEKO
Assistant Professor

金子 聖子
特任助教



卓越生の内訳





Marina IWASA
磐佐 まりな

Dept. of Science of Biological Production
農学府 生物生産科学コース

Talking about the "Outline of Global Leadership I and II" classes, it was my first experience both to think about business planning and drive the team project independently, so I found that making suitable solutions for the needs was more difficult than I expected. I learned various things through this lecture. We discussed the setting needs and the solutions over and over until everyone understands. Thanks to our mentor, his comments were very helpful. I recognized the way of thinking in business planning is similar to that in research. However, the point to make the optimal solution for the customers in business is different from that for the research.

「グローバル卓越リーダー概論 I & II」では、ビジネスについて考えること、チームで主体的にプロジェクトを進めることのどちらも私にとっては初めてでした。「ニーズに合った解決策を考える」ことは言葉で聞く数倍難しく、チームミーティングは何度も難航しましたが、メンターの先生のアドバイスも踏まえ、全員が納得するまで徹底的に課題設定と解決策の模索を行うことができました。ビジネスプランニングにおいて、考えを深めていく一連のプロセスは研究と同様だと感じましたが、最終的に様々なことを考慮して最適解を導くという点が異なって興味深く、新たな学びとなりました。



Tatsuya SUDO
須藤 達也

Dept. of Food and Energy Systems Science
食料エネルギーシステム科学専攻

"normal life" at graduate school.

Through the "Seminars for Creation of New Industries," I thought about what I should do to start a new business that makes use of my research results. In daily research, I am always thinking about "novelty" and "logic." Therefore, it was a very valuable experience to think from the business aspects such as "who will be the targets of the business" or "how large the market" is. I want to play an active role as an unprecedented leader by utilizing my knowledge and skills that could not be obtained in a

「新産業創出セミナー」では、「研究成果を活かした事業を開拓するにはどうすればいいか」を考えるという貴重な経験ができました。普段の研究では新規性や論理構成を一番に考えることが多かったです。そのため、「顧客をどう絞るのか」「市場規模はどの程度なのか」などビジネスの側面から物事を考えたのはとても新鮮でした。「普通の」大学院生活では得られるはずのなかった知識や経験を糧にして、今までにない卓越リーダーとして活躍していきたいと思います。

Tomoaki YAMAGUCHI
山口 友亮

Dept. of Int. Environmental and Agricultural Sciences
農学専攻 国際イノベーション農学コース

The demand for rice is increasing rapidly in Africa, and Kenya is not an exception. The goal of my research is to improve cultivation management and increase yield of rice by utilizing growth data estimated by remote sensing. However, through my visits to Kenya, I was made aware of other factors limiting productivity, such as insufficient infrastructure, abuse of the buying power by traders, and the preferences of the local people besides cultivation management. This experience made me realize that in order to solve a problem, it is important to directly collect information in the actual site and consider issues from various perspectives.

アフリカでは米の需要が急増しており、ケニアも例外ではありません。私の研究はリモートセンシングで推定したイネの生育データを活用することで、その栽培管理を改善し、収量を向上させることが目標です。しかし、現地を訪れることで実際には栽培管理以外にも不十分なインフラやトレーダーによる買いたたき、現地の人々の嗜好が生産性の制限要因となっている側面を知ることができました。ある課題を解決するには、現場で生きた情報を収集して、多様な視点から物事を見ることが重要であると痛感させられました。



Ingon CHANPORNPAKDI
インオン チャンポンパックディー

Dept. of Electronic and Information Engineering
電子情報工学専攻

I have learned from these classes is not implementable only for my research, but also for my future career since machine learning applications are almost unlimited.

My research field is biosignal processing, specifically electroencephalogram (EEG). We need machine learning in our data analysis too, so I decided to take WISE data science classes. The classes included both mathematical theory which will be useful to publish the paper, and coding which is the practice skill that we need the most. Both Prof. Kondo and Prof. Khanh are very kind and supportive. Attending these classes made me understand the logic of machine learning clearer. I think the knowledge

私の研究分野は脳波の信号処理で、機械学習がよく使われています。そのため、私は卓越大学院のデータサイエンスの授業を受けることにしました。この授業は論文執筆に必要な数学的理論、機械学習の実用に最も重要なプログラミングスキルも含まれています。近藤先生とKhanh先生も親切で協力的でした。この授業を通じて、私は機械学習論理をはっきり理解することができました。機械学習の応用分野はほぼ無制限のため、この知識は研究分野だけではなく、きっと将来的にも役に立つと思います。



MBOUP Aissatou
ンブupp アイサトゥ

Dept. of Food and Energy Systems Science
食料エネルギーシステム科学専攻

During the TUAT-Steinbeis University Workshop held online in November 2020, we had lectures about Japanese and German business and culture, and groupworks in mixed teams about real world cases given by German and Japanese companies. Our team mission was to create a business plan for a German company willing to enter the Japanese office furniture market. Through this workshop, I could learn about the German and Japanese culture and way of business, business planning, and the Japanese office furniture market. This experience changed my way to see things, before only as a researcher, and now including a perspective of business.

2020年11月にオンラインで開催された東京農工大学シュタインバイス大学研修では、日独のビジネスや文化についての講義を受けながら、企業から与えられた事例について混成チームでのグループワークを行いました。私のチームのミッションは、日本のオフィス家具市場に参入したいドイツ企業のビジネスプランの作成でした。このワークショップを通して、日独の文化や両国でのビジネスのやり方、事業計画、日本のオフィス家具市場について深く学ぶことができました。

Keisuke MATSUMURA
松村 圭祐

Dept. of Applied Chemistry
応用化学専攻

I have been studying energy storage devices from the basic material level in my laboratory. In the WISE program, I take my research to a challenging level and try to combine microorganisms and energy storage technology to obtain electricity from plants. The program, which recognizes and supports exciting and unknown ideas, allows me to conduct free and exciting research. In addition, in the lectures where I learn various skills, I have made friends with various specialties and nationalities, such as agriculture and disaster management, and I feel that my ideas have been greatly expanded.

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私は研究室では、蓄電デバイスを基礎的な材料レベルから研究しています。卓越大学院では研究を挑戦的に展開し、微生物と蓄電の技術を組み合わせ、植物から電力を得ようとしています。ワクワクするような未知のアイデアを認めて支援してくれるプログラムにより、自由に楽しい研究ができています。また、様々なスキルを学ぶ講義の中で、農業や災害対策など様々な専門と国籍を持つ仲間ができ、発想が大きく拡張されている実感があります。

Digital Agricultural Knowledge and Information System (DAKIS)– Agricultural System of the future



Prof. Dr. Sonoko Dorothea Bellingrath-Kimura

Co-head of Research area Land Use and Governance, Leibniz Centre for Agricultural Landscape Research (ZALF), Germany
Professor, Humboldt University of Berlin, Faculty of Life Science, Institute of Agriculture and Horticulture, Germany

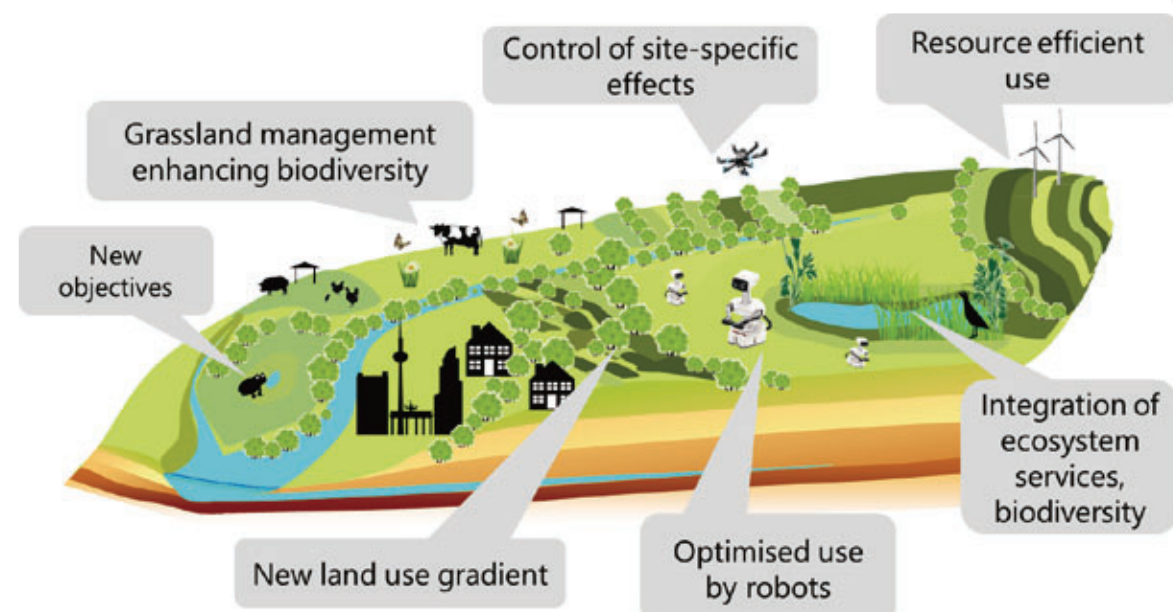
Prof. Bellingrath-Kimura has been appointed as joint professor of the Leibniz Centre for Agricultural Landscape Research (ZALF) and Humboldt University of Berlin, Germany, since 2015. She is the co-head of the Research Area Land Use and Governance. She worked at Tokyo University of Agriculture and Technology, Japan, where she was one of the first tenure-track associate professors. She has been internationally active as visiting professor/researcher at several international universities, such as Cornell University, São Paulo University, and Technical University of Munich. She is committee member of International Union of Soil Science, Society of Crop Science as well as editorial boards. Her main research interest is the cross- and interdisciplinary approach to optimize ecosystem services in agroecosystems. Beside her research activities, she is active as a mentee for early career female scientists in various countries.

Digitization in agriculture is advancing rapidly. How extensive the changes will be due to digitization in agriculture and what effects these will have on our agro-ecosystems cannot yet be foreseen yet. But, let us draw a vision, how it should be in the future;

Imagine the year 2050. Farmer Meyer inspects his fields. A drone flies above him and measures the plant biomass in his fields. The data tell her when the best time to harvest is. Field robots pull the weeds between the beets that grow in a hollow. Other autonomous machines fertilize the wheat on the small slope next to the beets. Before doing this, she used sensitive sensors to determine exactly which nutrients the

plants were lacking. The farmer is satisfied. All plants look healthy and strong. She will have a good harvest in late summer. At the Farm-Meyer, there is now space for up to five crops in a single field. She has also thought of nature conservation and created an ecological protection area, many insects and field birds can be seen in her field.

From the drone's, the field looks like a colourful patchwork. But behind this apparent chaos is a sophisticated system. Each plant grows exactly where its needs are best met. At one point in his field - where the crops have been growing poorly in recent years, because the soil here is sandy and poor in nutrients, farmer Meyer has created a flower strip with



Vision of DAKIS

wild herbs. The insects hum between margarites, lupins and mallow trees. The farmer created the plan for her plant cultivation this year with the help of a digital system, DAKIS. Back to 2020. Today, agriculture is caught in a field of tension with partly contradicting objectives. In addition to the increasing demand for food and bio-based raw materials, agriculture demands efficient use of resources, the need for climate adaptation, has to provide ecosystem services and biodiversity, the minimization of health risks, compliance with ethical guidelines and greater integration with value networks. These partly contradicting requirements could be balanced by means of smart farming.

Our vision is to use innovative agricultural management systems to enable an expanded understanding of the complex interactions within the agro-ecosystem, resulting in spatially and functionally diversified cultivation systems that are able to harmonize contradicting land use goals. It could be automated, small-scale cultivation systems that are specifically tailored to the needs of society and integrate the provision of ecosystem services and the preservation of biodiversity from the planning process to production and marketing.



Small stripe fields

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PatchCrop experimental site in Germany

Thanks to the DAKIS agricultural management system, the dynamic, flexible provision of ecosystem services and biodiversity through agricultural production is subject to comprehensive transparency, as entire value chains from the producer to the consumer in urban areas can be viewed. The new resource-efficient work organization made possible by smart farming, through digital platforms and networked field robots, provides the farmer with information and decision-making aids and thus creates the basis for new cooperation between farmers and farms. The networking of farmers with one another, combined with the knowledge of the location-related, social demand for ecosystem services, results in a new form of land use along the natural biogeophysical boundaries and functions of the landscape, an ecosystem approach. Management cooperation between land users will be completely redefined and the separation of different land use systems (e.g. arable land, grassland, forest) will be partially dissolved. This leads to a change in the agricultural landscape, including through "island or patch cultivation". Our research on the agricultural system of the future has just started. Do have a look to the project and think how the future should be!

This year, most of classes and activities were online, but everyone expanded their network, get cooperation, and practice a heart-to-heart dialogue based on sincere attitude and positive action. Let's make the most of this experience and tools, and enjoy the next year.

今年度は、オンラインの授業や活動が多く窮屈だったと思いますが、皆さん、真摯な姿勢と積極的な行動力により、ネットワークを拡げ、協力を得て、気持ちの通う対話を実践されたいと思います。この経験とツールを活かして、次年度はさらに楽しみましょう。

Yoko ICHIJO
Associate Professor

一條 洋子
特任准教授





PHAN Minh Khanh
ファンミンカン

Assistant Professor, WISE Program
卓越大学院プログラム特任助教

Editor's Note

"Bloom where you are planted" – these words came to my mind when I saw an article about delivering the first COVID-19 vaccines to Japan. Thanks to science and research, humans have always been able to improvise, adapt, and overcome any crises. Without research, there would be no vaccines. It should also be added that a gap from the research to real life is a huge distance, especially in this fast-moving world. The WISE-TUAT program, featured by "new industries creation" and "diversity", is designed to support students to build a bridge from research to practice. Along with the continuous development of society, the program strives nonstop with the belief that we all have the power to make the world a better place.

「置かれた場所で咲きなさい」、新型コロナウイルスワクチンを日本に初めて届けたという記事を見たとき、この言葉が頭に浮かびました。科学と研究のおかげで、人間は常に柔軟に適応し、どんな危機にも打ち勝つ方法を見つけました。また、研究と実生活とのギャップは、特に変化の激しいこの世界では大きな距離であることも付け加えておきます。東京農工大の卓越大学院プログラムは、「新産業創出」と「多様性」をテーマに、研究から実践への架け橋となるように学生を支援するプログラムです。絶え間ない社会の発展とともに、本プログラムは私たち全員が世界をより良くする力を持っているという信念のもと、不断の努力を続けています。



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