Preface of Lithuania-Japan seminar 2021

Introduction

The research collaboration started between Aleksandras Stulginskis University (ASU) (now the Agriculture Academy of Vytautas Magnus University: VMU) and Hokkaido University (HU) in 2012 with a sharing of knowledge and research collaboration about the cell and molecule biology of a wild berry (Hoshino, 2022, Silva, 2022) (Fig.1 & Fig. 2). Next, we discussed the impact of environmental changes on forests via IUFRO activity (International Union of Forest Research Organization) which led to an exchange of scientists between two universities.

To further increase our collaboration, we decided to organize an international seminar sponsored by the Lithuanian State Science and Studies Foundation (LSSSF) and the Japan Society for the Promotion of Science (JSPS). We planned to hold the seminar in the 2020 fiscal year; however, we were forced to postpone the seminar until 2021 due to the Covid19 and its varieties. Finally, we held the seminar remotely in August, 2021. Because discussion time was very limited, we decided to continue the discussions by synthesizing our knowledge in research papers based on the abstract (Watanabe et al. 2021). We have chosen to call these papers “Extended Abstracts”. The academic research bulletin of the Field Science Center for Northern Biosphere (FSC) of Hokkaido University offered to publish them as a special issue “the Lithuania-Japan Seminar 2021”. For this special issue we collected further references and synthesized topics; some papers include authors from each university.

Social background

Under rapidly changing environments, we need to create sustainable agroforestry systems using green methods. We can achieve this goal by using environmental microbiology in horticulture, crop production, forest science, and environmental science. Since 1995, biodiversity conservation has been developing, and establishing the Access to Genetic Resources and Benefit Sharing (ABS) rules brings us stricter regulations to protect genes and species in the member countries (COP 2010, Aichi Prefecture). We should collaborate and exchange more students if we would like to use natural genetic resources more smoothly based on the ASB rules.

Lithuanians experienced a severe nuclear accident with the meltdown at Chernobyl, Ukraine, when it was a province of the former Soviet Union in 1986. Unfortunately, we also had a similar situation with the Fukushima Nuclear Power Plant accident. With utilizing the plant nutrition approach for the past decade, however, we avoided partly radioactive cesium (Cs) toxicity by applying massive amounts of potassium (K) to the soil. In the keynote lecture, Professor Takuro Shinano of the Plant Nutrition Laboratory shared the techniques to implement this successful process that improves the agriculture environment while eliminating Cs toxicity.

A brief sketch of our collaboration

In 2012, cell and molecule biologists from our universities started to exchange research materials and their experiences in cell biology (polyploidy breeding) of a wild berry and the introduction of ectomycorrhizae fungi to low pH environments. An ASU member organized a Forest Health Workshop for the IUFRO and COST-EU meeting at the Kaunas campus of ASU (now VMU) in 2012. Three ecophysiologists from Hokkaido University (HU) joined to share their research on forest biological activities under changing environments. The rector of ASU visited our university in May 2014 to conclude a Memorandum of Understanding (MOU) between our schools in 2015

Both universities proposed to organize an international seminar between the two universities and related organizations in 2019. Based on the discussions between the two universities (VMU and HU), we selected the topics “biodiversity conservation and natural resources management based on a biotechnological approach to plant-microbe interaction under a changing environment.”

The goal of our seminar was 1) to continue the research collaboration and promote student exchanges

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based on what we learned in this seminar, 2) to use genetic resources based on the ABS in the COP 2010. We hope to collaborate further to improve the quality and quantity of haskap and blueberry plants. Also, we will strive to identify characteristics of various forest tree species that will allow them to grow in special soil conditions (low pH and wet). 3) Based on the impressive record of this seminar, we will improve our knowledge of Sustainable Development Goals (SDGs), primarily related to sustainable agriculture and forest resource management using environmental microbiology under changing environments. Our seminar will contribute to developing research and education in both universities.

Social impact and future perspectives

Lithuania, located in central Europe, is well known to the Japanese for its agriculture specialties such as honey and linen and for the humane work of Mr. Chiune Sugiura during WWII. Lithuanian agricultural sciences are unique in developing biological production and management under a changing environment, such as elevated ozone, nitrogen (N) deposition, and excessive phosphorous deposits in water basins. Global climate change is creating new challenges for agriculture and forestry.

The School of Agriculture of Hokkaido University and the Agriculture Academy of VMU have similar histories in science. Hokkaido University originated from the Sapporo Agricultural College, founded in 1876, making it the oldest bachelor-level college in Japan. At the same time, the Agriculture Academy of VMU started in 1924, making it the oldest agriculture school in Lithuania (Lithuania Agriculture University was re-established in 1996 after the country gained its independence from the former Soviet Union). Based on our close collaboration from 2012, we hope to increase our activities in the future.

Brief summary of the extended abstract

At first, we can learn how to make wise use of the genetic resources of wild plants, such as haskap (honeysuckle blueberry) (Hoshino et al. and Žilinskaitė et al.). In addition, we summarized tree breeding and forest genetics in Japan (Nakada and Kita et al.). Moreover, we will be able to improve the methods of sustainable bio-resource management based on environmental microbiology including alien species (Qu et al. on larch; Kitaoka et al on black locust). We hope to investigate ways to stabilize seacoast forests struggling under salt stress and increased nitrogen deposition (Marozas et al., Augustaitis et al.). Also, we expect to obtain new biotechnology from Lithuania's significant efforts at afforestation using two or three species of pine (genus *Pinus* spp.) and black locust on dunes along the seacoast (Fujita et al., Matsunami et al.). We propose the wise use of plant-microbe interactions to establish tree and shrub plantations, focusing mainly on ectomycorrhizae and wood-decaying fungi. Ectomycorrhizae are expected to be greening materials for conifer plantations, and wood-decaying fungi are candidates for regulating extraordinary growth in vegetation, especially in black locust.

Based on our research, we will synthesize our previous knowledge and techniques in resource management under increasing CO_2 (Takagi et al.), acid soil adaptation in shrub (Watanabe). N deposition (Fujita et al.), and ground-level ozone in plant and insect interaction (Masui et al.). We will offer the results of our research to individuals involved in the forestry industry (Sugai et al.), biological conservation (Brazaitiis and (Marozas), and landscape management in both countries.

We thank LSSSF and JSPS for supporting the fund of our seminar and for FSC of Hokkaido University, Hokkaido Forestry Research Institute of HRO and Forestry & Forest Products Research Institute for offering the chance to showing current activities.

We hope this special issue will contribute to the agriculture science of our respective countries for many years to come. The contents of the special issue are shown after this page.

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Reference

Watanabe T, Kitaoka S, Koike T, Marozas V (2021) Biodiversity Conservation and Natural Resources Management based on a Biotechnological approach to Plant-Microbe interaction under a Changing Environment. Abstract, Hakuyo Print, Sapporo, Japan.

Contents

Symbolic plant: Haskap (Honey berry: *Lonicera caerulea*)

Flower of Haskap in May (at Sapporo)
Two flowers are attached to one ovary. (by Prof. Y. Hoshino)

Fruits of Haskap in July (at Sapporo)
Color of fruits becomes dark purple when the fruits are matured.
Many fruits are arranged along with a branch. (by Prof. Y. Hoshino)