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Hot News
No.35

Search for the origin of Japanese oats II
—Field research of oats in mountainous region of Tajikistan—
Kazuhiro Sato (Institute of Plant Science and Resources, Okayama University)

P1 - 2

Three-part Series

Convention on Biological Diversity and the Circumstances Surrounding Genetic Resources (3)
Mutsuaki Suzuki (Intellectual Property Unit, National Institute of Genetics)

P2

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Search for the origin of Japanese oats II

—Field research of oats in mountainous region of Tajikistan—

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Institute of Plant Science and Resources,
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Oats are known to have originated from an ancestral wild plant found in the Middle East approximately 10,000 years ago. We are conducting field research on oats that are indigenous to or cultivated in the regions along their propagation route from their place of origin to Japan. The research group consisting of researchers mainly from Okayama University initiated the field research from the Caucasus region located on the west side of the Caspian Sea and visited Uzbekistan and then a remote region of Tajikistan on the west end of the Himalaya Mountains. In this field research in the Central Asian region, the propagation of oats along the Silk Road was taken into account. During our investigation we made an interesting finding in that certain oats in a mountainous region of Tajikistan showed some characteristics similar to those of oats in the East Asia, and which were not found in oats of the central and the west side of the Central Asia.



Tajikistan, which is located in the west end of the Himalaya Mountains, is a mountainous country surrounded by Afghanistan in the south, Uzbekistan in the west, Kyrgyzstan in the north, and China in the east. Tajikistan is, both ethnically and culturally, strongly influenced by Afghanistan and Iran and used to be the southernmost territory of the former Soviet Union in Central Asia. In addition, Tajikistan is considered as one of the poorest countries in the Central Asia after the civil war of the 1990' s. More than a half of the land in Tajikistan is mountainous with ranges at an altitude over 3,000 m; the southern half of the land is called Pamir Mountains, which is ethnically and culturally different from the other regions. Agriculture can be practiced on a relatively large-scale in the lowland area around the Fergana basin in the north and around the tributaries of Amu Darya River in the south.



Photo :
Oats in the Pamir
Mountains

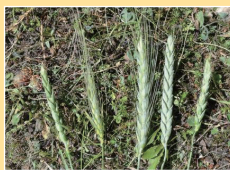


Photo :
Morphology of
the ears of oats

This area is located in the east end among the regions in which wild oat strains originated from the Middle East are distributed and in the west end of the distribution area where different types of oats are cultivated around China and the Himalaya. Hence, this region is ideal for researchers who study variations in oats.



Photo:
Farmland in Afghanistan viewed
from the boarder across the river

The group of investigators (2 from Japan, 2 from the Vavilov Research Institute in Russia, 2 domestic researchers, and a driver) conducted collecting activities primarily in the Pamir Mountains to the south of the national land, which is about the size of one-third of Japan' s land area, by a car for 14 days from August 10 to 23. In total, there were 57 collection sites located at altitudes between 818 m and 3,417 m and approximately 118 samples of cultivated barley and wheat varieties and related plants were collected.

Since the distribution of wild oat strains in these regions was low, mainly indigenous strains were collected. The Ismaili community led by Aga Khan, an Islamic leader, is involved in the business of distributing agricultural seeds; therefore, cereal seeds, particularly wheat seeds, are propagated on a regular basis. Many improved varieties distributed in this business were cultivated in relatively well-conditioned wheat farm fields. In contrast, indigenous wheat strains were cultivated in ill-conditioned mountain regions. The ears and beards of some of these wheat strains were analogous to those of the strains distributed in China, and uncommon indigenous strains without ligules were also cultivated. In contrast, most barley strains were six-rowed. Further, naked barley varieties were identified for the first time during collection activities in the Central Asian region, which strongly exhibited the characteristics of barley in the Himalayan region. The naked barley varieties had colored grains (green as reported by Russian researchers) or normal grains; however, these varieties did not show a variety of mutations in the morphology of beards and ears and the grain color, which are the characteristics of the varieties in Tibet and Nepal. A domestic agricultural engineer explained that this difference is possibly due to the fact that these 2 barley strains were derived from 2 high-quality barley strains that were selected and distributed from the indigenous strains in the Soviet Union in the 1950' s. Therefore, a large part of the variations in cultivated barley strains have most likely been lost.



Photo: Farmhouse and barley field
typically observed in the Pamir region

The road along a river flowing toward southern Afghanistan was adjacent to the border of Afghanistan and surrounded by mountains with sheer cliffs. At these sites, we seldom felt insecure in terms of public safety and received kind reception from all local people. However, it was considered that the level of agricultural technology in these regions was low and agriculture education was strongly needed.



Female family in the Pamir



Barley (left) and wheat (right) seeds given by a farm

Three-part Series

Convention on Biological Diversity and the Circumstances Surrounding Genetic Resources (3) "Final Episode: Scenario of the Nagoya Protocol"

Mutsuaki Suzuki, Director, Intellectual Property Unit, National Institute of Genetics



Photo: Pamphlet issued by the Swiss Academy of Sciences describing the model contract terms of benefit sharing in the Convention on Biological Diversity.



In this issue, global activities related to the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), which is closely related to CBD, are described.

Worldwide Activities

At present, domestic laws in relation to the access to genetic resources and benefit sharing have been established only in 10% of the affiliated countries, including India and Philippines. However, many other countries are also promoting action plans for CBD.

In China, it is now mandatory to describe the origin of genetic resources in patent applications and monitor the domestic patent applications of genetic resources. In addition, there is a plan for developing a database that can collectively manage genetic resources and traditional knowledge in the country for the conservation of this data. Moreover, laws related to genetic resources are also being drafted, and it has been made mandatory for foreigners to report to the central government in order to access to genetic resources and arrive at a consensus on benefit sharing between applicants and authorities. The group preparing the draft is willing to establish a specific fund that targets Chinese herbal medicines, which are also consumed in Japan, and collect a part of the benefit. In response, affiliates involved in Chinese herbal medicine in Japan opposed to this idea and insisted that Chinese herbal medicine has evolved in Japan.

In Switzerland, the Swiss Academy of Sciences (SCNAT) promotes educational campaigns, prepares guidelines for non-profit use of genetic resources, and drafts a contract form. SCNAT insists that since the monetary benefit sharing is difficult in academic research, non-monetary benefits such as sharing of information achieved by collaborative research and research achievements and educations should be shared.

In contrast, although the US is a nonmember of CBD, public and private institutions and universities in the US are enthusiastic about advancing action plans to CBD. The National Institutes of Health (NIH) has prepared the response guidelines. In addition, the International Barcode of Life (iBOL) promotes activities to apply the "Barcode of Life" for the conservation of CBD as a DNA analysis for biological species identification.

International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

Besides CBD, ITPGRFA proposed by the Food and Agriculture Organization (FAO) of the United Nations has been implemented. Japan is currently advancing to ratify the treaty. ITPGRFA targets specific agricultural crops and plants including 35 crops and 29 genera of grasses such as rice, wheat, apples, and potatoes, but soybeans and tomatoes are not included due to the opposition of China and Mexico. In ITPGRFA, the use of a Standard Material Transfer Agreement (SMTA) is obliged for transferring genetic resources, and 1.1% of the value that is evaluated by reducing 30% from the amount of sales that should be paid to FAO for the commercial use of achieved products. This system has attracted attention as a specific benefit-sharing mechanism among multiple countries. This policy can be applied only to the genetic resources that are used for the research in relation to foods, agriculture, and breeding; it cannot be applied to the resources used in the chemical, medical, or pharmaceutical industries and other non-food or non-forage industries. It was determined that the plants targeted by ITPGRFA were excluded from the Nagoya Protocol. In future, discussions regarding certain genetic resources that could be targeted by either ITPGRFA or CBD will be necessary.

In conclusion, we described the views on CBD and genetic resources in the series of 3 articles. We would like to continue to pay attention to CBD and related activities for smooth circulation and application of genetic resources.

Relevant websites:

- SCNAT : <http://www.biodiversity.ch/index.en.php> (Swiss Academy of Sciences)
- ITPGRFA : <http://www.planttreaty.org/>
- iBOL : <http://www.ibol.org> (International Barcode of Life)

Announcements

(Details are available at <http://www.nbrp.jp/>)

Training session on the classification of wheat species (genera *Triticum* and *Aegilops*) based on the external morphology and the observation of their chromosomes

Date : May 31 (Tuesday) and June 1, 2011 (Wednesday)

Place : The North Campus of Kyoto University and an Experimental Farm for the Laboratory of Plant Genetics, etc.

Participation Fees : Free (self-pay for transportation and accommodation)

Open recruitment of implementing institutions for the "Grant for promoting the common use of research and development facilities and other activities (National BioResource Project)" in the fiscal year 2011.

Recruitment period : From February 25 (Tue) to March 22 (Tue), 2011 (up to 18:00)

Program recruited: Genome information consolidation program

Download the PDF version of this newsletter at <http://www.shigen.nig.ac.jp/shigen/news/>

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BioResource Information

- (NBRP) www.nbrp.jp/
- (SHIGEN) www.shigen.nig.ac.jp/
- (WGR) www.shigen.nig.ac.jp/wgr/
- (JGR) www.shigen.nig.ac.jp/wgr/jgrUrlList.jsp

Editor's Note

Groups of the National BioResource Project (NBRP) Wheat and NBRP Barley cooperatively developed a map of seed collection sites and released it on the webpage (<http://www.shigen.nig.ac.jp/wheat/collectionMap/map.html>). Prof. Sato's group not only preserves the seeds collected in the field works but also investigates the properties of the seeds in detail and releases the information to the researchers worldwide. Wheat might be a topic of discussion in the future since it is targeted by ITPGRFA. In any case, we all hope that the scenario of genetic resources will appropriately progress to achieve their smooth circulation and application. (Y.Y.)

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