

富山県・石川県におけるバラ科果樹遺伝資源の探索・収集

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Exploration and Collection of Rosaceous Fruit Tree Genetic Resources in Toyama and Ishikawa Prefectures

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Summary

Wild genetic resources from indigenous populations of rosaceous fruit tree species in Toyama and Ishikawa prefectures were examined and collected. A total of 14 accessions including 13 from *Malus toringo* and one from *Pyrus pyrifolia* were collected. In addition, materials for population analysis were collected from three populations of *M. toringo* and one population of *Eriobotrya japonica*.

KEY WORDS: genetic resources, apple, pear, *Malus*, *Pyrus*, Toyama, Ishikawa, Hokuriku.

Introduction

We have been seeking and collecting wild and escaped Japanese rosaceous fruit trees, especially maloid species (apples, pears, etc.) in various regions of Japan for the purpose of evaluation and use^{1), 2), 3), 4)}. This year (2007) we have been searching for such trees in Toyama and Ishikawa prefectures of the Hokuriku region. This region is on the Sea of Japan coast in north-central Honshu Island. The fruit tree genetics of this region can be characterized as follows:

1) The genetic structure of wild species in this region may differ from those in areas along the Pacific Ocean. It is well known that there are many species that are morphologically differentiated between the Pacific and Sea of Japan coasts. Recently this phenomenon has been explained by the phylogeographical process, that is, by the difference of refugia in the late

glacial age (ca. 10,000 years-B.P.)⁵⁾. We chose *Malus toringo* (Siebold) Siebold ex Vriese (“Zumi” or “Mitsuba-kaidou” in Japanese) as the target species from this viewpoint, since it grows widely in both areas.

2) Until relatively recently, the Sea of Japan area was the main contact point for international exchanges between Japan and continental Asia. Thus it is assumed that Asian fruit trees were also introduced and cultivated in this area. In fact, several local cultivars and Japanese pear [*Pyrus pyrifolia* (Burm.f.) Nakai] similar to Asian cultivars have been discovered in the region⁶⁾. Thus we sought out old wild pear trees in the study area.

3) Due to the influence of the warm Tsushima Current, the coastal areas of the Hokuriku region are relatively warm in winter and warm-temperate plant communities are scattered along the shore. Thus we tried to discover trees of the escaped loquat [*Eriobotrya japonica* (Thunberg) Lindley].

Methods

Initially, we examined plant specimens in representative herbaria in this region to assess the distribution of target plants. We visited the following facilities: the Department of Biology at Kanazawa University (KANA), the Toyama Science Museum (TOYA) and the Niitsu Community Center of Niigata City. Data already collected in the principal herbaria in Japan were also referenced.

The first field survey was conducted in June of 2007 to discover trees and to collect flower and fresh leaf samples for morphological and molecular studies. The second and third field surveys were performed in September and December of 2007, respectively, to acquire scions for genetic resource collections as well as to collect mature fruit and seed samples. Voucher herbarium specimens were also collected. Based on the information obtained from the preliminary field surveys and from herbarium specimens, we conducted our surveys mainly in the municipalities of Toyama-shi, Kamiichi-machi and Himi-shi of Toyama Prefecture and in Komatsu-shi and Hakusan-shi of Ishikawa Prefecture.

Results and Discussion

A total of 14 accessions were collected as scions (Table 1). thirteen individuals of *Malus toringo* were collected from four localities. We also found and collected one *Pyrus pyrifolia* sample. In addition we collected flower, fruit, seed and fresh leaf samples of *M. toringo* from three different populations and fresh leaf samples of *Eriobotrya japonica* from one population.

The following are brief descriptions of the habitats of the collection sites.

1) Arimine Reservoir in Toyama-shi

This artificial lake, constructed in 1959, is situated at about 1,080 m above sea level. *Malus toringo* trees were distributed around the lakefront where the bases of trees are submerged during the rainy season. Since this habitat was formed after the lake, these trees have evidently grown since that time. Other than this habitat, a few trees of *M. toringo* were found in deciduous forests around the lake.

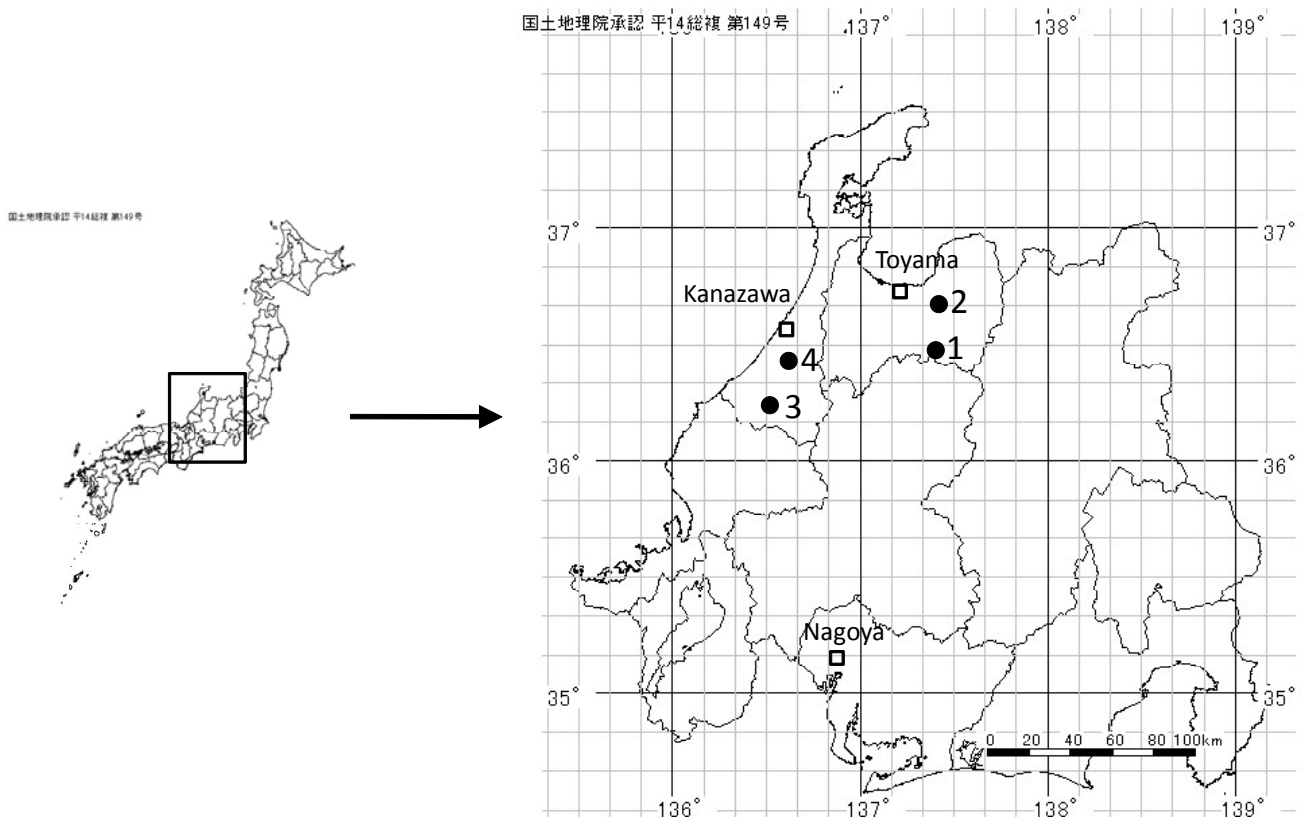


Fig. 1. Collection sites of genetic resources in Toyama and Ishikawa prefectures.

Maps were made with KenMap⁷⁾

2) Kamiichi-machi

Based on a herbarium specimen deposited at TOYA, we found a tree of *P. pyrifolia* at Inamura. Since it was situated in a small wooded area of an abandoned settlement, it may have been either a cultivated or escaped tree. We also found a tree of *M. toringo* at Aso, where a very small settlement exists. This tree grew on the edge of a riparian crop field. We imagined that this species commonly grew on the riverside at low altitudes in the past. Now *M. toringo* is seldom found at low altitudes in Central Japan and it is now regarded as a montane plant. However, we found many herbarium specimens that had been collected at low altitudes in the past (at least several decades ago). So this tree is a precious survivor in a past habitat.

3) Himi-shi

Based on information that *Eriobotrya japonica* grew wild at Ōsakai in Himi-shi, we surveyed this place. A small remnant population of *E. japonica* existed on a wave-cut cliff at Ōsakai Fishery Harbor. Since we surveyed this area only in June, we collected only fresh leaf samples.

4) Komatsu-shi

A population of *Malus toringo* exists on Yokodani Moor in the southern part of Komatsu-shi. This moor had been originally surveyed by Mr. M. Nakae, president of the Nature Conservation Society of Komatsu City. According to his observation, flowers and fruits of this population are somewhat larger than those of other populations. Our survey was conducted by Mr. Nakae and Mr. T. Ohta of Komatsu City Hall. Fewer than ten trees grew around a small moor

in a basin situated between two ridge-lines at 860-870 m in elevation. Flowers and fruits of this population were evidently larger than those of trees in Nagano and Yamanashi prefectures. Further studies are necessary for morphological and genetic differentiation of this species in Central Japan.

5) Hakusan-shi

Mr. Nakae also gave us information that *Malus toringo* with normal sized-flowers grows wild in the Shishiku-kogen highlands in Hakusan-shi, specifically at the ridge-line of mountains on the boundary between Hakusan-shi and Kanazawa-shi. We found several individuals of *M. toringo* around a mountain path. The habitat was deciduous forest on the southward and westward slopes near the ridge-line. The geographical conditions here were very different from those of other habitats we have surveyed of this species, i.e., moors, marshes, and so on. Though the habitat of *M. toringo* is not limited to wetlands, it is apparently becoming increasingly difficult to find this species in non-wetland habitats.

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和文摘要

富山県と石川県においてバラ科果樹野生遺伝資源の探索・収集を行い,富山県富山市有峰,同県上市町浅生,石川県小松市横谷湿原及び同県白山市獅子吼高原においてズミ 1 3 点を採集した. また富山県上市町稲村においてナシ 1 点を収集した. この他にズミ 3 集団とビワ 1 集団について集団遺伝学解析のための資料収集を行った.

Table 1. List of Malus and Pyrus genetic resources collected in Toyama and Ishikawa prefectures.

Collection Name	Species	Date	Place	Municipality	Prefecture	Locality No. (Fig.1)	Longitude (E) (ddd-mm-ss)	Latitude (N) (dd-mm-ss)	Alt. (m)	Field No.
TOYAMA MALUS COL.NO.2007-1	<i>Malus toringo</i>	2007/9/21	Arimine	Toyama-shi	Toyama	1	137-25-08	36-27-29	1135	Arm-t1
TOYAMA MALUS COL.NO.2007-2	<i>Malus toringo</i>	2007/9/21	Arimine	Toyama-shi	Toyama	1	137-26-18	36-26-37	1115	Arm-t2
TOYAMA MALUS COL.NO.2007-3	<i>Malus toringo</i>	2007/9/21	Arimine	Toyama-shi	Toyama	1	137-26-18	36-26-37	1115	Arm-t3
TOYAMA MALUS COL.NO.2007-4	<i>Malus toringo</i>	2007/9/21	Arimine	Toyama-shi	Toyama	1	136-27-52	36-25-44	1080	Arm-t7
TOYAMA MALUS COL.NO.2007-5	<i>Malus toringo</i>	2007/9/21	Arimine	Toyama-shi	Toyama	1	136-27-52	36-25-45	1080	Arm-t9
ISHIKAWA MALUS COL.NO.2007-1	<i>Malus toringo</i>	2007/9/22	Yokodani moor	Komatsu-shi	Ishikawa	3	136-33-00	36-13-48	870	Ykd-t3
ISHIKAWA MALUS COL.NO.2007-2	<i>Malus toringo</i>	2007/9/22	Yokodani moor	Komatsu-shi	Ishikawa	3	136-33-00	36-13-48	870	Ykd-t5
ISHIKAWA MALUS COL.NO.2007-3	<i>Malus toringo</i>	2007/9/22	Yokodani moor	Komatsu-shi	Ishikawa	3	136-33-00	36-13-48	870	Ykd-t7
ISHIKAWA MALUS COL.NO.2007-4	<i>Malus toringo</i>	2007/9/23	Shishiku high plateau	Hakusan-shi	Ishikawa	3	136-39-18	36-26-24	670	Skk-t3
TOYAMA MALUS COL.NO.2007-6	<i>Malus toringo</i>	2007/9/24	Aso	Kamiichi-machi	Toyama	2	137-24-43	36-39-36	400	- ¹⁾
TOYAMA PYRUS COL.NO.2007-1	<i>Pyrus pyrifolia</i>	2007/9/24	Inamura	Kamiichi-machi	Toyama	2	137-25-15	36-40-57	300	- ¹⁾
ISHIKAWA MALUS COL.NO.2007-5	<i>Malus toringo</i>	2007/12/23	Shishiku high plateau	Hakusan-shi	Ishikawa	4	136-39-23	36-26-20	685	Skk-t4
ISHIKAWA MALUS COL.NO.2007-6	<i>Malus toringo</i>	2007/12/23	Shishiku high plateau	Hakusan-shi	Ishikawa	4	136-39-25	36-26-17	685	Skk-t5
ISHIKAWA MALUS COL.NO.2007-7	<i>Malus toringo</i>	2007/12/23	Shishiku high plateau	Hakusan-shi	Ishikawa	4	136-39-26	36-26-15	700	Skk-t6

1) without field number



Photo 1. An indigenous habitat of *Malus toringo*.
Yokodani Moor, Komatsu-shi, Ishikawa Pref.



Photo 2. Infructescence of *Malus toringo*.
Arimine, Toyama-shi, Toyama Pref.



Photo 3. Fruits of *Pyrus pyrifolia*. Inamura,
Kamiichi-machi, Toyama Pref.

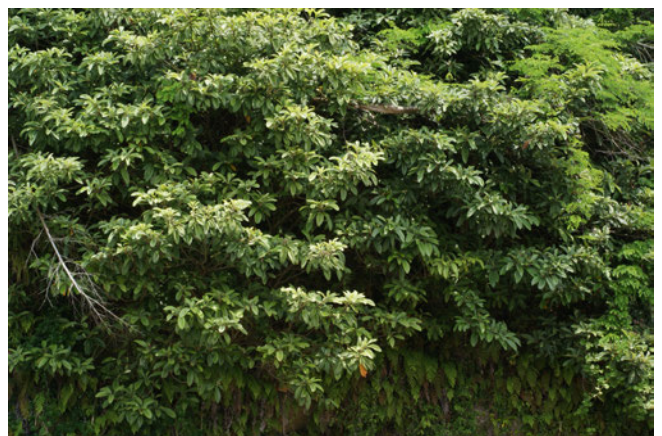


Photo 4. An indigenous habitat of *Eriobotrya japonica* on a wave-cut cliff. Ōsakai Fishery Harbor,
Himi-shi, Toyama Pref.