

Exploration and Collection of *Malus* and *Pyrus* Genetics Resources in Tochigi Prefecture

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Summary

Wild genetic resources from indigenous populations of *Malus baccata* var. *mandshurica* and *M. toringo* in Tochigi Prefecture were examined and collected. A total of 8 accessions of genetics resources including 4 from *M. baccata* var. *mandshurica* and 4 from *M. toringo* were collected. Materials for population analysis were also collected from two localities. In addition, a local old tree of *Pyrus pyrifolia* was collected.

KEY WORDS: genetic resources, apple, pear, *Malus*, *Pyrus*, Nikkō, Tochigi.

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 evaluating and exploiting them^{1), 2), 3), 4)}. This year (2008) we have been searching for such trees in Tochigi Prefecture of the Kanto region. We mainly intended to explore *Malus* and *Pyrus* for the following reasons;

Malus: A small natural populations of *Malus baccata* var. *mandshurica* was rediscovered from Okunikkō area of this prefecture⁵⁾. The origin and relationship of this population are questioned and further investigations are desired.

Pyrus: The true natural populations of *Pyrus ussuriensis* var. *ussuriensis* in Japan are only distributed the Kitakami Mountains of Iwate Prefecture⁶⁾. However this plant is said to be distributed in some other regions in local floristic studies, especially in Northeast Japan. Trees morphologically identified as this species in the latter areas are perhaps *P. ussuriensis* originated from either Japanese natural populations or Chinese cultivated plants, or hybrids between this species and *P. pyrifolia*. In either case, the origin and the nature of these trees should be investigated.

Methods

To begin with, we examined plant specimens in the herbarium of the Tochigi Prefectural Museum (TOCH) for examining the distribution in the prefecture. Data already collected in the

principal herbaria in Japan were also referenced.

The first and second field surveys were conducted in April and June of 2008, respectively, to discover trees and to collect flower and fresh leaf samples for morphological and molecular studies. The third and fourth field surveys were performed in October and November of 2008, respectively, to acquire scions for genetic resource collections as well as to collect mature fruit and seed samples. Voucher herbarium specimens were also collected.

Results and Discussion

A total of 9 accessions of genetics resources as scions were collected (Table 1). In addition seed samples were also collected from these trees. We also collected fresh leaf samples from several tens of individuals in Senjugahara (*Malus baccata* and *M. toringo*) and Senjōgahara (*M. toringo*) for population genetic analysis.

The following are brief descriptions of the collection sites (Fig. 1).

1) Senjugahara in Nikkō -shi

It is a small plain situated at the west bank of Chūzenji-ko Lake. Both *Malus toringo* and *M. baccata* var. *mandshurica* grew here, but the distribution range of the latter species was very limited⁵⁾.

2) Senjōgahara in Nikkō - shi

Only *Malus toringo* grew here. Both red and yellow type were found whereas only red type was found in Senjugahara, The yellow type was relatively rare (about 10 % or less). We also observed the yellow type only in Nagano Prefecture among our previous exploitations^{2), 3), 4)}. We presumed the geographical variation of the ratio of two types.

3) Furunagi

This site is situated at the east bank of Chūzenji-ko Lake. It is the type locality of *Malus baccata* var. *nikkoensis* Asami⁷⁾, which is now merged into var. *mandshurica*⁵⁾. We found a tree from here and it was a rediscovery after the eighty years of the first report of this taxon from this site.

4) Kobayaku Elementary School

An old tree of pear grew in the schoolyard. As to tradition, it had planted before the foundation of the school in 1873. If this was true, the age of the tree is more than 130 years. The diameter at breast height was about 70 cm, but the trunk had a large sinus about 30 cm in diameter. The fruit was about 6 cm in diameter and without calyx-lobes. So, it is morphologically identified as *Pyrus pyrifolia*, not *P. ussuriensis*.

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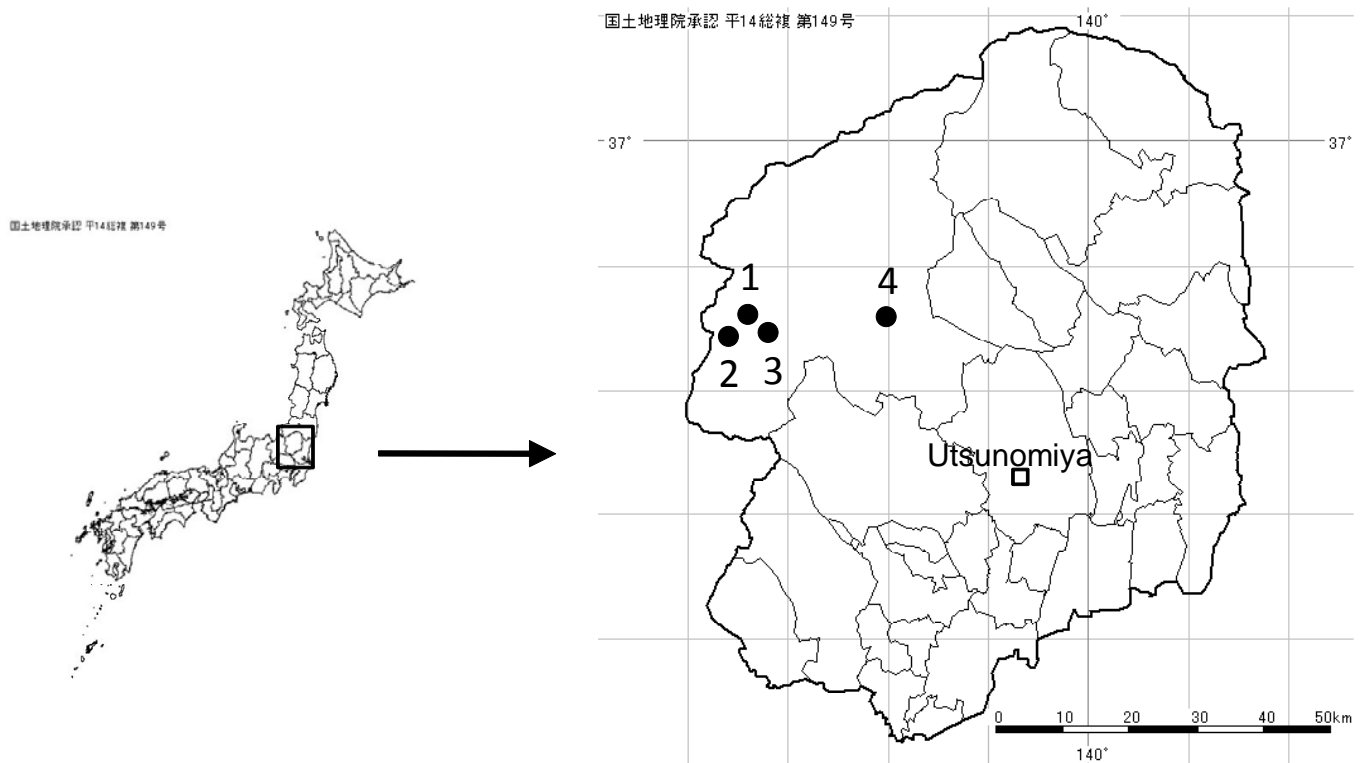


Fig. 1. Collection sites of genetic resources in Tochigi Prefecture. Maps were made with KenMap⁸⁾

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和文摘要

栃木県においてリンゴ属とナシ属の果樹野生遺伝資源の探索・収集を行い、日光市中禅寺湖畔の千手ヶ浜、古籙及び戦場ヶ原においてエゾノコリンゴ4点とズミ4点を採集した。また日光市小百小学校でナシ1点を収集した。この他にズミとエゾノコリンゴ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 Tochigi Prefecture

| Collection Name | Species | Date | Place | Municipality | Locality No. (Fig.1) | Longitude (E) (ddd-mm) | Latitude (N) (dd-mm) | Alt. (m) | Field No. |
|-----------------------------|------------------------|------------|---------------------------|--------------|----------------------|------------------------|----------------------|----------|-----------------|
| TOCHIGI MALUS COL.NO.2008-1 | <i>Malus toringo</i> | 2008/10/5 | Senjōgahara | Nikkō-shi | 1 | 139'26 | 36'47 | 1400 | NkSj-t2 |
| TOCHIGI MALUS COL.NO.2008-2 | <i>Malus toringo</i> | 2008/10/5 | Senjōgahara | Nikkō-shi | 1 | 139'26 | 36'47 | 1400 | NkSj-t7 |
| TOCHIGI MALUS COL.NO.2008-3 | <i>Malus toringo</i> | 2008/10/6 | Senjōgahara | Nikkō-shi | 1 | 139'27 | 36'46 | 1400 | NkSj-t15 |
| TOCHIGI MALUS COL.NO.2008-4 | <i>Malus toringo</i> | 2008/10/6 | Senjōgahara | Nikkō-shi | 1 | 139'27 | 36'46 | 1390 | NkSj-t24 |
| TOCHIGI MALUS COL.NO.2008-5 | <i>Malus baccata</i> | 2008/10/6 | Senjugahara | Nikkō-shi | 2 | 139'25 | 36'45 | 1280 | Nk-b5 |
| TOCHIGI MALUS COL.NO.2008-6 | <i>Malus baccata</i> | 2008/10/6 | Senjugahara | Nikkō-shi | 2 | 139'25 | 36'45 | 1280 | Nk-b7 |
| TOCHIGI MALUS COL.NO.2008-7 | <i>Malus baccata</i> | 2008/10/6 | Senjugahara | Nikkō-shi | 2 | 139'25 | 36'45 | 1280 | Nk-b33 |
| TOCHIGI MALUS COL.NO.2008-8 | <i>Malus baccata</i> | 2008/10/6 | Furunagi | Nikkō-shi | 3 | 139'27 | 36'45 | 1280 | NkCh-b1 |
| TOCHIGI PYRUS COL.NO.2008-1 | <i>Pyrus pyrifolia</i> | 2008/11/20 | Kobyaku Elementary School | Nikkō-shi | 4 | 139'40 | 36'45 | 375 | - ¹⁾ |

1) without field number



Photo 1. A tree of *Malus baccata* var. *mandshurica*, from which epitype specimens were collected⁵⁾. Senjugahara, Nikkō-shi, Tochigi Pref.



Photo 2. Infructescences of *Malus baccata* var. *mandshurica*. Senjugahara, Nikkō-shi, Tochigi Pref.



Photo 3. Infructescences of *Malus toringo* (yellow type). Senjōgahara, Nikkō-shi, Tochigi Pref.



Photo 4. Infructescences of *Malus toringo* (red type).
Senjōgahara, Nikkō-shi, Tochigi Pref.



Photo 5. Fruits of *Pyrus pyrifolia* collected from the tree of
the Kobyaku Elementary School.



Photo 6. A tree of *Pyrus pyrifolia*.
Cultivated in the schoolyard of the
Kobyaku Elementary School, Nikkō-shi,
Tochigi Pref.