Hiroyuki IKETANI\textsuperscript{a,*}, Yujiro HORII\textsuperscript{b}, Mikihiko OOWE\textsuperscript{c} and Yoshikane IWATSUBO\textsuperscript{d}: New Record of \textit{Malus baccata} var. \textit{mandshurica} (Rosaceae) from Northern Tohoku Region Seashores, Japan

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Summary: Two small populations of \textit{Malus baccata} (L.) Borkh. var. \textit{mandshurica} (Borkh.) C. K. Schneid. (Rosaceae) were discovered by the seashore in the northern Tohoku region of Japan. These discoveries confirm that the species also grows in the coastal areas of this region, as well as those of Hokkaido.

\textit{Malus baccata} (L.) Borkh. var. \textit{mandshurica} (Borkh.) C. K. Schneid. is distributed in the upper temperate to subarctic zone in Northeast Asia, including Japan. It grows commonly near the seashore in Hokkaido (Ishimaru et al. 1997a, 1997b). However, its distribution in Honshu has been unclear, because it is very difficult to distinguish this species from others, especially \textit{M. torimo} (Siebold) Siebold using herbarium specimens. Therefore, its distribution has been described only as “central and northern Honshu and Hokkaido” in floristic works (Ohwi 1953 and later versions, Kitamura 1979, Ohashi 1989, Iketani and Ohashi 2001). One of us (H. Iketani) thoroughly investigated herbarium specimens of this plant and its relatives and explored in the field, and reported that the distribution in Honshu was unambiguous only in Yamanashi and Nagano Prefectures and surrounding mountains; in Nikko, Tochigi Prefecture (a small population); and in the Kitakami Mountains of Iwate Prefecture (Iketani 2004). Although Iketani (2004) recorded probable or possible specimens of the species from a few localities of the Shimokita and Oga peninsulas in the northern Tohoku region, their status had not been confirmed in the field. As northern Tohoku is geographically and climatically close to Hokkaido, \textit{M. baccata} var. \textit{mandshurica} may grow in coastal areas there, as confirmed by its discovery behind coastal sand dunes on the Osuka-Kaigan seashore of Hachinohe-shi, Aomori Prefecture (Iketani et al. 2006).

Here we report the discovery of \textit{M. baccata} var. \textit{mandshurica} at two places on the eastern and western sides of the northern Tohoku region. Field observations in neighboring areas suggest that this species grows widely in at least the eastern coastal area of this region.

Distribution on Oga Peninsula in Akita Prefecture

A small population of \textit{Malus baccata} var. \textit{mandshurica} plants grows in national forest near the Ashinokura-sawa Valley on the Oga Peninsula, Oga-shi (Fig. 1A). It was discovered by one of us (Y. Horii) in 2006 and was identified from field observations in 2012 and from grafted living plants collected from the wild (Fig. 1B). The population is about 200 m a.s.l. and 0.5 km from the sea in a secondary broad-leaved forest on a steep west-facing slope. We found only four individuals, measuring about 5 m tall at most.

Our discovery confirms that of Inokuma (1934). Whether the species is distributed in
other places in this area is unknown. It may occur elsewhere on the Oga Peninsula, because similar habitat continues on the western side of the peninsula, where access is very difficult. Sandy seashore lines other seaside areas of Akita Prefecture, but despite ease of access, the species has not been discovered there.

Distribution on northern Sanriku Kaigan coast in Iwate Prefecture

One of us (M. Ooue) found a small population on private land at Tarō-aonotaki, near Myōjinzaki Cape, Miyako-shi (formerly Tarō-chō), in the northern Sanriku Kaigan coastal region in 2014. These plants were identified from field observations in the same year and
from grafted living plants collected from the wild (Fig. 1C, D). The habitat is about 20–30 m a.s.l. and less than 100 m from the sea. This location narrowly escaped the tsunami of 11 March 2011. We found seven individuals, all less than 1 m tall.

Although we discovered only one small population, other populations may exist in this region. One of us (H. Iketani) noticed this species on cliffs at the water’s edge in this region in 2008. Most habitats were later destroyed by the tsunami, although a few individuals survived (Fig. 1E, F). As this region experiences tsunamis every few decades, surviving populations near the seashore must explain the rapid recolonization at the water’s edge. This species is also distributed in the Kitakami Mountains (Iketani 2004, Iketani et al. 2006), but only at 400 m a.s.l. at the lowest (usually above 600 m a.s.l.), and the nearest population is about 30 km from the seashore. So if coastal populations regenerate from seed from the mountainous region, the distribution area of the two populations would be continuous.

Although we have found only a few individuals of this species from Hachinohe-shi to Miyako-shi, the distribution might extend to the Shimokita Peninsula to the north and more broadly to the south. It is interesting that plants in this region grow both at the water’s edge and at high altitude. In Hokkaido, in contrast, they grow behind coastal sand dunes, more than 100 m from the shoreline (Ishimaru et al. 1997b). Therefore, the Sanriku and Hokkaido populations must be ecologically divergent, or populations would also grow at the water’s edge in Hokkaido.


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References

Iketani H. 2004. Rediscovery of *Malus baccata* var. *mandshurica* at Nikko and the reexamination of its

Iketani H., Mase N. and Sato Y. 2006. Exploration and
collection of *Pyrus* and *Malus* genetic resources in


池谷祐幸a, 堀井雄治郎b, 大上幹彦c, 岩坪美兼d; 北東北地方の海岸地帯でのエゾノコリンゴ（バラ科）の新産地

エゾノコリンゴ *Malus baccata* (L.) Borkh. var. *mandshurica* (Borkh.) C. K. Schneid. は、標本になると同属のズミ *M. toringo* (Siebold) Siebold などとの区別が困難なため、日本での分布にはこれまで不明な点が多かった。北海道では海岸付近でよく見られるが、本州北部の同様な立地で従来から知られていた確実な箇所は青森県の大須賀海岸だけであった。本研究では、秋田県男鹿半島と岩手県宮古市（旧田老町）でエゾノコリンゴの自生集団を発見した。後者を含む北三陸地域では、この他にも磯浜の波打ち際などで自生個体を発見してお