

Chapter 15

Significance of the Preservation of Crop Genetic Resources in the Islands of Kagoshima

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1. Characteristics of the Kagoshima Islands

Since Nansei Islands are located in a transitional climatic zone having subtropical to temperate regions, they show diverse plants and crops that have adapted to the different weather conditions (HOTTA 2002). The average annual rainfall in this region is more than 2,000 mm. Because of the warm and humid environment, many endemic species are also found in this area. The numbers of diverse wild plants and endangered plant species found in Amami-Oshima Is. are greater than those found in any other region in Kagoshima; hence, the importance of maintenance of crops in this region has been indicated (HOTTA 2002). Furthermore, the islands in Kagoshima harbor many wildlife species; the plants growing in these regions can be utilized for food, medicinal, and ornamental purposes.

Endangered species are recorded in the red list category of the International Union for Conservation of Nature and Natural Resources, Ministry of Environment, Japan. As per this list, most of the wildlife species found in these islands are endangered. The National Institute of Agrobiological Science Gene Bank and National Center for Seeds and Seedlings provide information on crop (including cereals, vegetables, fruits, and root and tuber crops) preservation in Japan. However, information on the preservation of native crops is lacking, and few databases have recorded the cultivation methods and areas of native crops.

2. Examples of cultivated crops

HOTTA (2002) reported that Tamoto-yuri (*Lilium nobilissimum* Makino), which grows only in Kuchinoshima Is. and Uke-yuri (*Lilium alexandrae* Coutts.) found in Amami-Oshima Is. are also designated as endangered wild species; these

lilies have become an important mother stock of the garden lily cultivar. In Kagoshima Prefecture, citrus varieties are abundant, and YAMAMOTO *et al.* have been extensively investigating native citrus in these islands. YAMAMOTO *et al.* (2003, 2005, 2006, 2008) surveyed the native citrus in Kikaijima Is., Tokunoshima Is., Amami-Oshima Is., Kakeromajima Is., Yoroshima Is., Ukeshima Is., Okinoerabujima Is., and Yoronjima Is.

Next, YAMAMOTO *et al.* (2006) introduced 25 native citrus varieties from these islands to Toso Orchard, Experimental Farm, Faculty of Agriculture, Kagoshima University, to undertake their preservation. The characteristics of fruit development and phytonutrients of Keraji (*Citrus keraji* hort. ex Tanaka) originating from Kikaijima Is. were mainly investigated. Keraji is a seedless, early-maturing cultivar, having fragrant fruits; it is known to contain phytonutrient components. The possibility of cultivation of this species for its economic value has been reported to be high in the future (YAMAMOTO *et al.* 2008, 2009, 2010).

ISHIHATA *et al.* (1997) analyzed the content of peel oil obtained from some native citrus species cultivated in Amami-Oshima Is., Tokunoshima Is., Okinoerabujima Is., and Yoronjima Is. and reported that the peel of a few citrus species had high content of a characteristic fragrance; these aromatic citrus were considered to be endemic to Amami Islands.

However, because of the lack of sufficient investigation and field research, the name of these citrus species varied in different areas of the islands, and occasionally, the same variety was identified by homonymous names (YAMAMOTO *et al.* 2003). Therefore, establishment of plant preservation systems are necessary in this region. HOTTA (2003) introduced yam (*Dioscorea*) and Taro or

Satoimo in Japanese (*Colocasia*) from the southern area to Nansei Islands for cultivation. The yam mainly cultivated in Nansei Islands is water yam (*Dioscorea alata* L.) from South-East Asia (tropical zone) and not the Chinese yam (*Dioscorea opposita* Thunb.) from the temperate zone.

Water yam with purple (red) and white tubers are easily cultivated in home gardens in Nansei Islands. In mid-January, red and white yams are used to decorate houses and to prepare for congratulatory meal to celebrate New Year (Fig. 1). ONJO (2004) and ONJO *et al.* (2005) described that 30 % of the water yam collected from Nansei Islands were of the purple type, and they had a peculiar name in this region. Hence, the purple yam may be considered to have a special ritual significance.

Taro (*Colocasia*) cultivars are roughly divided into 2 types on the basis of the chromosome number: diploid and triploid. The diploid type cultivars are mainly cultivated in the tropical zone and the triploid type in the temperate region. The triploid varieties are more common in the northern part of Kyushu, Japan, and the diploid varieties are usually found from the southern part of Kyushu, to Nansei Islands, Japan (HOTTA 2003, ANKEI 1993, 1995). Nansei Islands have been thought to be an important cultivation area of taro in Japan.

Another type of taro (*Colocasia*) known as “Taimo,” which grows in paddy fields or swamps, has been found from Taiwan to Kyushu. At pres-

ent, it is only found in Nansei Islands (SHIMONO 1980; Fig. 2). Foxtail millet (*Setaria italica* (L.) P. Beauv.) was also mainly cultivated in Nansei Islands, but it is now extinct in this region (KANO 2007). ICHITANI *et al.* (2005) analyzed the DNA isolated from the native Japanese radish (Shimadaikon) planted in Yoronjima Is. and the improved Japanese radish varieties marketed by seed companies. They found that these 2 varieties could be naturally crossed, and that the resulting hybrid seeds were used for further cultivations. Hence, they emphasized that the local plants varieties should be maintained and cultivated separately to preserve them.

3. Preservation method of native crops

As mentioned above, Nansei Islands is a very unique region harboring many original and native crops because of the warm and humid weather condition.

HOTTA (2003) indicated that these crops have been cultivated since the period of Satsuma feudal clan, and hence, are precious genetic resources; these crops are found from Southern Kyushu to Nansei Islands, but are now becoming scarce. Although there is lack of research, these native crops that have traditional values have been cultivated over generations at a local scale. Furthermore, the functional ingredients of some of the native crops have been identified, and their

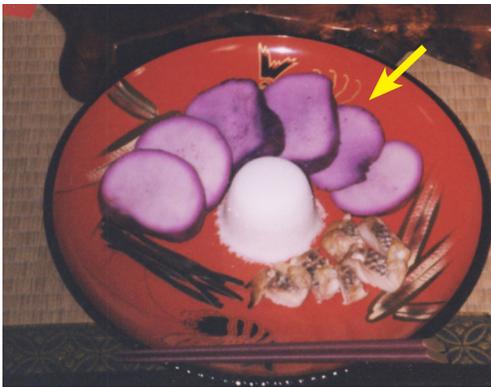


Fig. 1. Purple water yam used for decoration during New Year celebrations in Amami-Oshima Is. (Arrow shows the yam). Photo: Seigi MATSUI.



Fig. 2. Taro (Taimo) cultivated in a paddy field in Amami-Oshima Is.

application in ways other than as food has been considered.

Because of the rapid expansion of cash crops, the numbers of native crops are declining. Further, this phenomenon has been noted not only in the Kagoshima Islands but also worldwide. Identifying groups, places, and methods for the preservation of native crops is a difficult task. NISHIKAWA (2005) proposed the Stakeholder Participation for Management of Crop Genetic Resources method. This method might be very useful for preserving native crops even in the islands. In fact, in Amami-Oshima Is. and Tokara Islands, a non-profit organization (NPO) preserves the native crops, and such efforts need to be considered in the future.

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