

Recent Trend of Peach Breeding in Japan

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Most of peach cultivars grown in Japan belong to the white peach to be used for dessert. In recent years, growing of nectarine, which has fuzzerless fruit skin, has increased gradually, but its growing regions are restricted. On the other hand, the canning peach with yellow flesh, suitable for processing, has been improved to make it adaptable to natural condition of Japan, but its acreage is small.

The climate of Japan, being located in temperate zone and surrounded by sea, is mild and humid in the growing season. Therefore, mosts of peach cultivars originated in East Asia are resistant to diseases.

History of peach improvement in Japan

The origin of peach cultivars of Japan is shown in Fig. 1. In the early Meiji era, 1872, good cultivars were introduced from China, Europe and U.S.A., and since then peach has been grown commercially as a fruit tree. Before that, native peaches with small fruit and hard melting flesh were grown only in a small scale.

High temperature and heavy precipitation in the summer season of Japan cause severe occurrence of diseases and pests, as well as vigorous tree growth. As progenies of Shanghai (Chinese Cling) introduced from the eastern China* were resistant to diseases and suitable for our taste, white peaches derived from them have become the main group. On

the contrary, cultivars introduced from Europe and western part of U.S.A., both have small summer-precipitation, were difficult to grow in Japan due to their susceptibility to diseases, and hence not widely grown. So we succeeded in breeding many cultivars by hybridization with East Asian cultivars. Particularly, canning peach and nectarine from Europe were hybridized with East Asian peaches resistant to diseases, and they have been able to grow everywhere.

North China and South China group are scarcely grown in Japan, because the former is susceptible to diseases and the latter is damaged by frost for its early flowering.

Breeding objectives

Climatic adaptations and extension of season of maturity are important objective in many breeding programs. But, breeding objectives of cultivars, as dessert and canning peaches, or nectarines are different with their uses. Emphasis has been given to cultivars for processing so far, but now breeding program with an emphasis on dessert peach is going on, because 2/3 of the total peach consumption is for fresh dessert.

On the other hand, replant failure (injury by successive replanting) occurs frequently in peach culture, and the use of healthy rootstocks is employed to avoid the failure. Therefore, effort is made in breeding rootstocks.

1) Peach for dessert

Cultivars from early ripening through late ripening are required. Attractive appearance, soft and fine texture, juicy, high sugar con-

* Eastern part of China, along the lower Yangtze River.

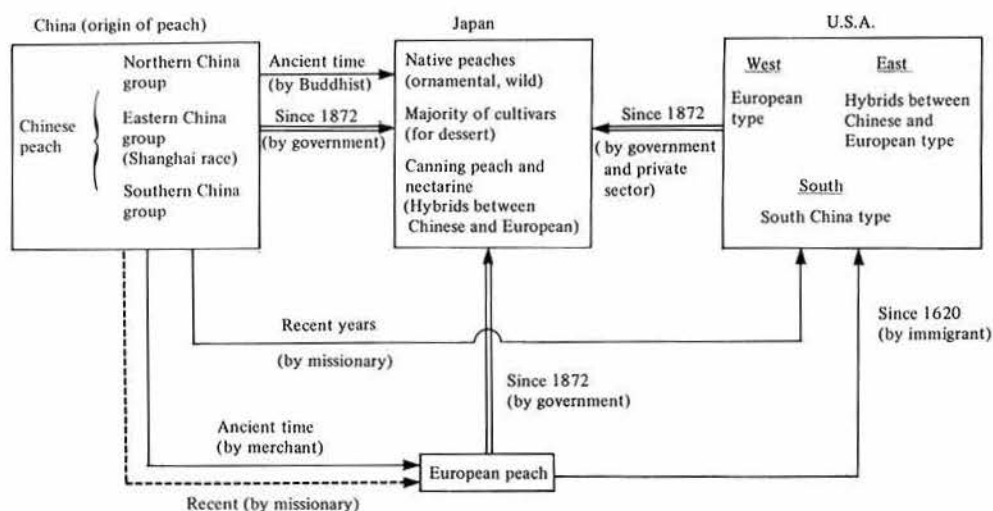


Fig. 1. History of peach cultivars in Japan.

tent, moderate acid and good keeping quality are all important traits needing improvement for dessert use for white peaches. Furthermore, some growing characters, such as good bearing, resistance to diseases and pests, are desired.

2) Nectarine

From early through late ripening is needed. Attractive red color, no cracking, high sugar content and moderate acid in taste, good aroma, soft and fine texture, good shipping and keeping quality are desired for yellow nectarines. Especially, cultivars which give stable production due to resistance to heavy rains and diseases are desirable.

3) Canning peach

Cultivars from early ripening through late ripening, resistant to diseases and pests, easy to grow, and fruit of 130–170 g each, with non-melting yellow flesh with few red pigment, clingstone, less split-pit and easy to process are required.

4) Rootstock

Easy propagation, vigorous and uniform seedling growth, and resistance to adverse environment, especially to nematode are the breeding objectives. Dwarfing rootstock, use-

ful for labor-saving, are also tested.

Breeding systems

In the Fruit Tree Research Station, peach breeding, mainly by hybridization is in progress. To diversify genic sources, germplasm introduction is made from U.S.A., South Africa, Australia, etc., for crossing with Asian cultivars. Selected hybrids are tested for regional adaptability and other characters in experimental stations located in main peach growing areas. The hybrids proved to be excellent in these tests are given cultivar-names and released.

To breed rootstocks resistant to nematode, a large number of wild peaches in Japan and other countries have been collected and tested for characters. At present, pedigree selection of native peaches, and hybridization breeding by the use of resistant genes of wild peaches or ornamental ones, both native in Asia are in progress.

On the other hand, many peach cultivars have been developed in the commercial sector, by the use of chance seedlings and bud mutations.

Table 1. New peach cultivars released in the Fruit Tree Research Station

Cultivars	Norin No.	Parentage	Ripening time	Flesh color	Texture	Stone	Use	Year released
Kanto-2	Norin-1	(Oka-3 × Or)-9 × (EE × T)-66	Middle	Yellow	Non-melting	Cling	Canning	1955
Kanto-5	2	(ki × T)-43 × (Oka-3 × Or)-9	Middle	Yellow	Non-melting	Cling	Canning	1955
Kanto-12	3	(ki × T)-11 × Oka-3 × T)-10	Late	Yellow	Non-melting	Cling	Canning	1955
Kanto-14	4	Okayama-3 × Orange cling	Late	Yellow	Non-melting	Cling	Canning	1955
Nishiki	5	Kanto-12 × Kanto-2	Middle	Yellow	Non-melting	Cling	Canning	1964
Akatsuki	6	Hakuto × Hakuho	Middle	White	Melting	Cling	Dessert	1979
First Gold	7	Nishiki × C-18-1	Early	Yellow	Non-melting	Cling	Canning	1980
Early Gold	8	Nishiki × Fortuna	Early	Yellow	Non-melting	Cling	Canning	1980
Flavor Gold	9	II-s-b-9 × Kanto-5	Middle	Yellow	Non-melting	Cling	Canning	1980
Sweet Gold	10	Fortuna × Kanto-5	Middle	Yellow	Non-melting	Cling	Canning	1980

Achievement of breeding

In the Fruit Tree Research Station, where hybridization was started in 1935, ten cultivars shown in Table 1 have been developed and released. At the initial stage of this hybridization breeding, emphasis was placed on canning peach. European canning peaches were crossed with disease-resistant Asian peaches and in 1955 four cultivars, Kantō-2, Kantō-5, Kantō-12 and Kantō-14, were released.²⁾ Improvements were made to develop canning peach with earlier ripening, and as a result, Nishiki was released in 1964,³⁾ followed by the release of two early ripening cultivars, First Gold and Early Gold, and two cultivars with excellent quality, Flavor Gold and Sweet Gold, in 1980.

As to the peach for dessert, systematic breeding was initiated in 1974, and a cultivar with excellent quality, Akatsuki, was developed in 1979 from the cross of Hakutō × Hakuho.⁴⁾ At present, other five selections are under test, and it is expected that early ripening and late ripening good cultivars will be released soon.

Breeding of nectarine has only a short history. Hybridization mainly with cultivars introduced from U.S.A. was made, and now the adaptability tests are in progress in various places.

As to the rootstock, several plants have been selected for resistance to root-knot nematode^{5,6,7)}. R-22-2, R-26-2, etc. are red-leaved, and R-32-10, R-33-1, etc. are green-

leaved. All of them are genetically homozygote as to the resistance, so that all seedlings taken from them are resistant.

Of the cultivars developed by commercial sector and registered, the followings are now growing. Early ripening cultivars: Nunome-wase, Sunago-wase, Kurakata-wase, Yamato-wase, Matsumori-wase, Wase-momoyama, etc. and medium ripening cultivars: bud mutants of Hakuho. In addition there are Asama hakutō, Nakatsu hakutō, Nishino hakutō, Shiga hakutō, etc., and late maturing nectarine, Shūhō, etc.

Prospects

The present situation that the majority of peach production in Japan is for the dessert use is expected to continue unchanged. In this case, two directions of improvements will be required: one is the excellent quality for high marketability and the other is the easiness to grow with saved labor due to manual labor shortage. Although the situation may differ with various growing areas better keeping quality and processing quality to produce nectar, juice, etc. will be required in the latter case.

At present, exchange of information and pollen is going on with U.S.A. and other countries. It is desirable to promote such research cooperation with many other countries in the future.

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