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# FRUIT TREE SCIENCE

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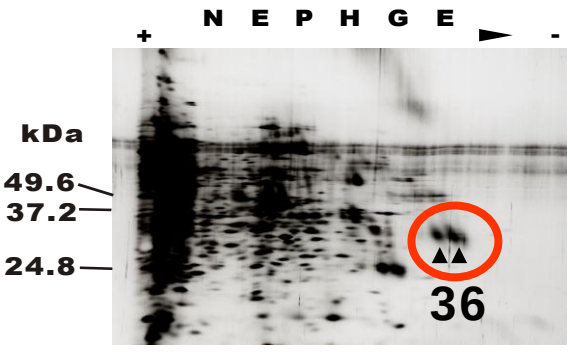
Pomology is a field of study that aims to solve all the aspects of problems occurring in the orchard, packing and shipping process, and storage. Pomology is based on the knowledge from wide areas of sciences, such as plant physiology, genetics, geography, meteorology, pathology, and entomology.

## Astringency loss in kaki (*Diospyros kaki*)

Astringency in kaki fruit is a very unique character. We are studying the physiology and genetics of astringency loss in kaki. The knowledge obtained is utilized to breed the PCNA (pollination-constant and non-astringent)-type kaki, whose fruit is most desirable for fresh consumption. We have developed several molecular markers for selecting PCNA seedlings. Furthermore, we are now surveying the kaki germplasm in China to find novel genetic resources for the PCNA type kaki breeding.

A new type of PCNA kaki found in China

## Gametophytic self-incompatibility in *Prunus*




2D-PAGE analysis of the stylar extracts of cherry

Many fruit tree species in *Prunus* exhibit monofactrorial gametophytic self-incompatibility. Since fertilization is very important in fruit production, we are attempting to elucidate the physiological and molecular mechanisms of gametophytic self-incompatibility in fruit tree species in *Prunus* and utilize the knowledge obtained for fruit production. So far, we have identified the pistil determinant (S-RNase) and pollen determinants (SFB) of self-incompatibility in *Prunus*.

## Bud dormancy in deciduous fruit tree

Bud dormancy in deciduous fruit tree species is a complex process necessary for plant survival in the unfavorable environment. Once formed in summer, buds enter a endodormant state and require a certain amount of cold temperatures to resume growth in a favorable environment. Recent global warming potentially causes serious problem such as irregular or loss of flowering. We are trying to find the internal factors or external signals controlling endodormancy.

Unseasonal flowering affected by global warming

## Keywords

***Astringency, dormancy, fruit quality, kaki, molecular breeding, persimmon, Prunus species, self-incompatibility, temperate fruit tree, tropical fruit***

## Recent Publications


**Seasonal abscisic acid signal and a basic leucine zipper transcription factor, DkbZIP5, regulate proanthocyanidin biosynthesis in persimmon fruit.**
Akagi, T., A. K.-Ikegami, S. Kobayashi, A. Sato, A. Kono, and K. Yonemori. (2012)
Plant Physiology 158: 1089-1102.

**Identificationof a Skp1-like protein interacting with SFB, the pollen *S* Determinant of the gametophytic self-incompatibility in *Prunus*.**
Matsumoto, D., H. Yamane, K. Abe, and Tao R. (2012)
Plant Physiology DOI:10.1104/pp.112.197343

**Functional and expressional analyses of *PmDAM* genes associated with endodormancy in Japanese apricot (*Prunus mume*).**
Sasaki, R., H. Yamane, T. Ooka, H. Jotatsu, Y. Kitamura, T. Akagi, and R. Tao. (2011)
Plant Physiology 157: 485-497.

**Proanthocyanidin biosynthesis of persimmon (*Diospyros kaki*Thunb.) fruit.**
Akagi, T., A. K.-Ikegami, and K. Yonemori. (2011)
Scientia Horticulturae 130: 373-380

**The S-RNase-based gametophytic self-incompatibility system in *Prunus* exhibits distinct genetic and molecular features.**
Tao, R. and A.F. Iezzoni. (2010)
Scientia Horticulturae 124: 423-433.

**Expressional regulation of *PpDAM5 and PpDAM6*, peach (*Prunus persica*) dormancy-associated MADS-box genes, by low temperature and dormancy-breaking reagent treatment.**
Yamane H, T. Ooka, H. Jotatsu, R. Sasaki, R. Tao. (2011)
J. Exp. Bot. 62: 3481-3488.

**Fine genotyping of a highly polymorphic *ASTRINGENCY*-linked locus reveals variable hexasomic inheritance in persimmon (*Diospyros kaki* Thunb.) cultivars.**
Akagi, T., R. Tao, T. Tsujimoto, A. Kono, and K. Yonemori. (2012)
Tree Genetics & Genomes 8:195-204.

**Comparative analyses of dormancy-associated MADS-box genes, *PpDAM5* and *PpDAM6*, in low- and high-chill peaches (*Prunus persica* L.).**
Yamane, H., R. Tao, T. Ooka, H.Jotatsu, R. Sasaki, and K. Yonemori. (2011)
J. Japan. Soc. Hort. Sci. 80: 276-283.