

Kagome meets tomatoes

The Founder, Ichitaro Kanie, Who Believed in the Potential of Tomatoes

1899
Ichitaro observes the germination of a tomato.

Tomatoes were first introduced to Japan in the mid-17th century. At the time, they were treated not as food but as a rare ornamental plant in Japan. It was only in the Meiji period (1868 – 1912) that tomatoes began to be consumed as food. This occurred after tomatoes were reintroduced from Europe and the United States together with other Western vegetables such as cabbages, onions, asparagus, and carrots. Ichitaro Kanie, who founded Kagome, returned to Japan after completing his duties in the First Sino-Japanese War (1894 – 1895) and began growing Western vegetables after being inspired by his superior's words in the Army. Tomatoes were included among these vegetables; however, their grassy smell and unfamiliar bright red color did not appeal to consumers. Tomatoes were the only vegetables that did not sell at all for the first four years and were left to rot in the fields, causing serious problems.



“Souka Shasei Zukan” by Kano Tanyu (Tokyo National Museum) Image: TNM Image Archive



Ichitaro Kanie (1904)

Ichitaro launches a tomato processing business.

Ichitaro still did not give up, however. At the agricultural experiment station in Aichi Prefecture where he worked temporarily to learn tomato cultivation techniques, he heard that in the United States, tomatoes were being used after processing. He immediately obtained a bottle of imported tomato sauce from a Western-style hotel and created a prototype through trial and error with his family. They peeled, simmered, and strained the tomatoes, and bottled the result. This was how they created the bright red tomato sauce. In July 1903, the tomato sauce that Ichitaro made in his barn at home was shipped out for the first time. Its color, which was more attractive than that of imported tomato sauce, and its fresh flavor appealed to consumers, and Ichitaro's business started out smoothly.

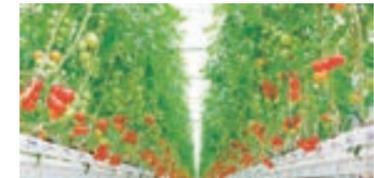


First factory and tomato straining (around 1910)

Difference between Fresh Tomatoes and Tomatoes for Processing

Fresh Tomatoes

Japanese people like to eat tomatoes uncooked. The reason is that tomatoes with pink flesh such as the Momotaro® tomato, which is suitable for eating raw, have been grown since the Meiji period, and many varieties have been created through improvements. Tomatoes with a variety of characteristics such as different sizes and flavors and high nutritional content such as lycopene and GABA are now sold, and varieties with red flesh are also sold as fresh tomatoes. They are grown by putting up supports in lanes or greenhouses (cultivation using supports).



Grown in a greenhouse



Fresh tomato dish



Tomatoes for processing

Tomato varieties for processing in Japan must adhere to the standards established by the Ministry of Agriculture, Forestry and Fisheries, which include that the tomatoes must be fully ripened, their red color must be brighter than the standard red plate, and their lycopene content must be 7 mg or higher per 100 g. The most distinct characteristic is that the skin is strong and the flesh is dense and difficult to squash, sufficient to withstand transportation in a container. Tomatoes for processing are cultivated without supports. They are grown by letting the stems crawl along the ground without using supports, which saves the labor of the producers and allows large-scale planting.



Grown under a large amount of sunlight



Tomatoes for processing are used for tomato juice, canned whole tomatoes, pizza sauce, etc.

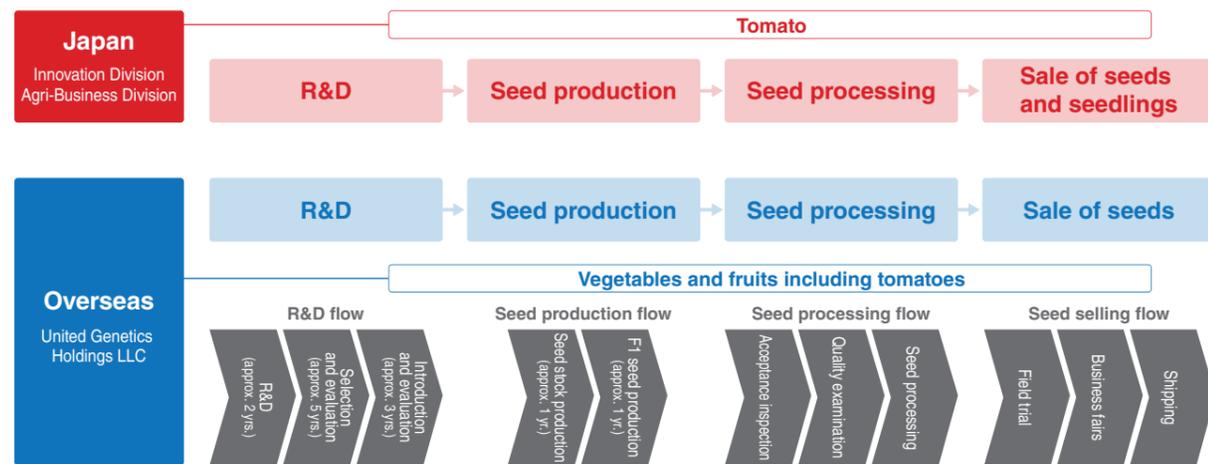
Kagome's business of tomatoes for processing

The most upstream part of the vertical integration business model. Kagome develops tomato varieties internally and sells seeds in 85 countries around the world.

Developing varieties and selling seeds



Kagome's research division in Japan stores a large amount of genetic resources, including 7,500 types of tomato seeds, and creates databases. Using these resources, we develop tomato varieties without using genetic modification technology. Kagome's subsidiary, United Genetics Holdings LLC (U.S.), develops and produces seeds of tomatoes and other vegetables and fruits and sells them in 85 countries around the world.



Varieties are developed through crossbreeding by forecasting market demand for several years into the future.

Because variety development takes at least five years, Kagome forecasts market demand for several years in the future, identifies flavors, traits, and pest resistance, etc. of tomatoes for processing that match the forecasts, and determines the specifications of parent varieties to produce such varieties. We then crossbreed the parent varieties created by collecting and combining genetic resources that potentially meet these specifications and produce a large number of new variety candidates. The new variety candidates are narrowed down by being repeatedly evaluated and improved at multiple facilities over several years, and the varieties that are ultimately selected are commercialized. The seeds (F1) that have been developed through this process undergo careful quality examinations and necessary sterilization, processing, etc. and are subsequently shipped out.

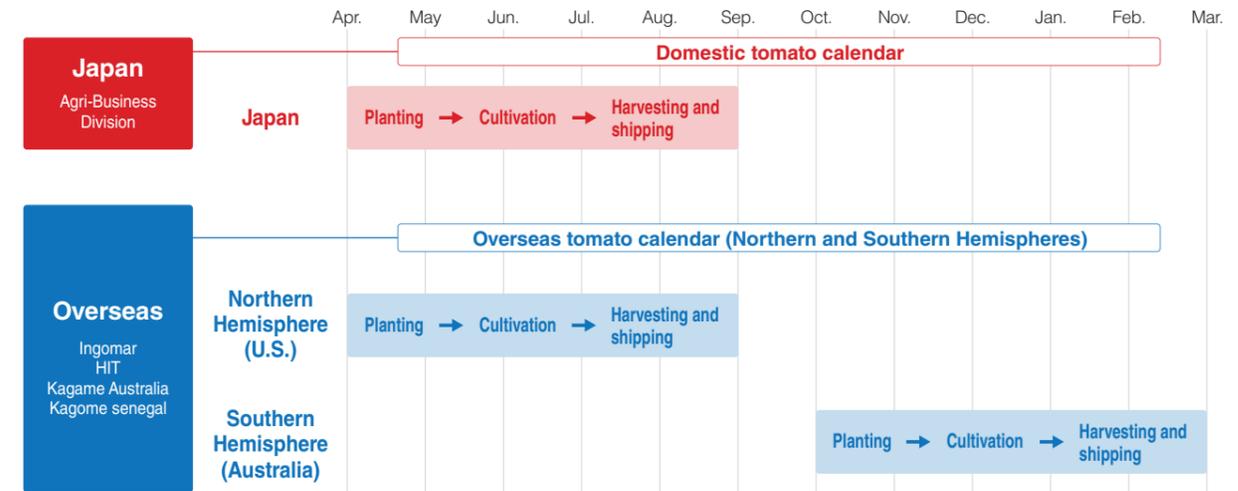


We are growing tomatoes for processing around the world. We operate agriculture with high safety standards based on the quality awareness that "fields are the primary production plant."

Agriculture



Kagome procures tomato products such as tomato paste from around the world. Kagome field masters who support the producers of tomatoes for processing that become the ingredients for such products strictly inspect the growth of tomatoes and agrochemicals used and maintain stable and safe cultivation.



Stable procurement by combining cultivation areas in the Northern and Southern Hemispheres

A system of stably procuring ingredients from around the world is required for selling tomato products all year round. The areas that are suitable for cultivating high-quality tomatoes are concentrated at latitudes 35 degrees north and 40 degrees south, which are called the tomato belts. Kagome's tomato production bases are distributed around these tomato belts in the Northern and Southern Hemispheres. The harvest season starts around July in Spain, Portugal, Italy, the U.S. (California), and Japan in the Northern Hemisphere and around January in Australia, Chile, and other regions in the Southern Hemisphere. Kagome has established stable procurement networks by combining production areas with different cultivation periods.

Yields of tomatoes for processing in Japan and overseas subsidiaries

Unit: tons

	2016	2017	2018
Kagome	19,399	18,944	17,300*
HIT	395,583	430,538	380,000*
KAU	236,612	157,299	177,237
Senegal	-	-	1,586

* Plan

Kagome's business of tomatoes for processing

Producing tomato paste that becomes the base for all tomato products to meet users needs

Primary processing



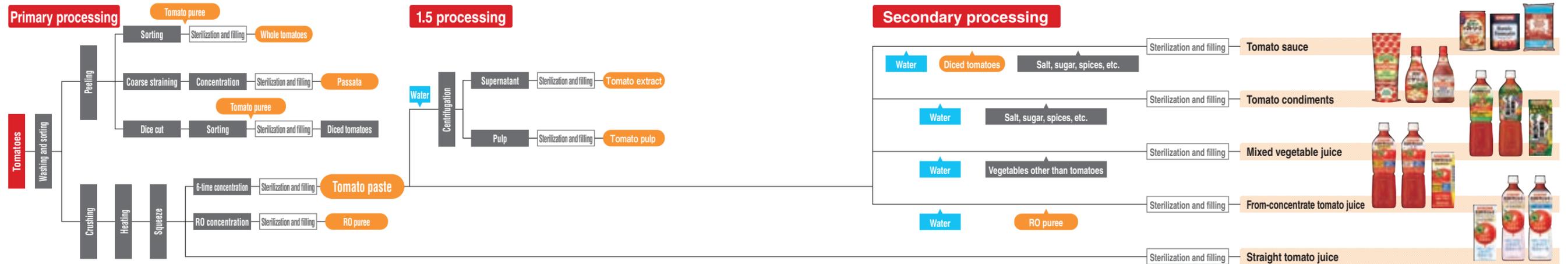
Primary processing is the process of changing raw tomatoes into manageable forms, which are broadly divided into two: making puree or paste after squeeze and concentration or processing without squeeze to maintain the tomato shapes. Tomato paste becomes an ingredient for various tomato products. Whole tomatoes that maintain their tomato shape and cut tomatoes are used as ingredients in a wide variety of dishes. Kagome maintains an extensive range of tomatoes for processing, including varieties and cultivation areas, and advanced production technology to meet the demand of consumers around the world.

From tomato juice to salsa sauce Providing a large variety of products that maximize the value of tomatoes

Secondary processing



A variety of tomato products can be made from the tomato paste produced in the primary processing. In the secondary processing, we manufacture a wide range of products, from condiments such as tomato ketchup and tomato sauce to beverages such as tomato juice and vegetable juice that utilize the flavor of tomatoes by adding flavorings and other ingredients to tomato paste.



High value provided by combining tomato cultivation areas, heating methods, and containers

Sweetness, sourness, taste, etc. in tomato flavors vary among cultivation areas in different countries and varieties. Tomato paste that becomes the base for many tomato products is produced by using the characteristics of each cultivation area and by selecting manufacturing methods suited to the purposes of use. The hot break process*1 can be selected for pizza sauces and meat sauces that require high viscosity, and the cold break process*2 can be selected for products that do not require viscosity. Kagome also offers a large selection of container sizes for household use to industrial use. Kagome's strength in primary processing is its ability to combine these to meet the varying needs of users.

*1 Hot break process: Creates high viscosity by heating tomatoes at a high temperature after crushing and deactivating the pectin breakdown enzyme to reduce pectin breakdown
*2 Cold break process: Creates low viscosity by heating at a low temperature that does not deactivate the pectin breakdown enzyme after crushing to promote pectin breakdown

■ Difference between tomato break temperatures

	Hot break	Cold break
Heating temperature	85°C - 95°C	60°C - 70°C
Viscosity	High	Low
Property	Smooth	Coarse
Brightness	Bright	Deep
Flavor	Sense of mildly simmered tomatoes	Sharp juicy flesh

Examples of variation of tomato products

Primary processing

 Puree concentrated by passing squeezed tomato through a reverse osmosis membrane tube and permeating out water. It is characterized by a fresher flavor and less color degradation compared to vacuum heating concentration. This RO concentration is Kagome's patented technology.

Secondary processing

 Broadly divided into two types – the straight type made by directly sterilizing and packing squeezed tomato, and the from-concentrate type made by reconstituting tomato paste with water. We manufacture tomato juice with a fresh flavor and fragrance, even when it is from-concentrate, by blending it with RO puree.

1.5 processing

 Tomato extract and tomato pulp are tomato ingredients obtained by centrifuging tomato paste with water added. Tomato extract is used to add tomato aroma, and tomato pulp is used primarily to enhance the texture of fiber in vegetable beverages, etc.

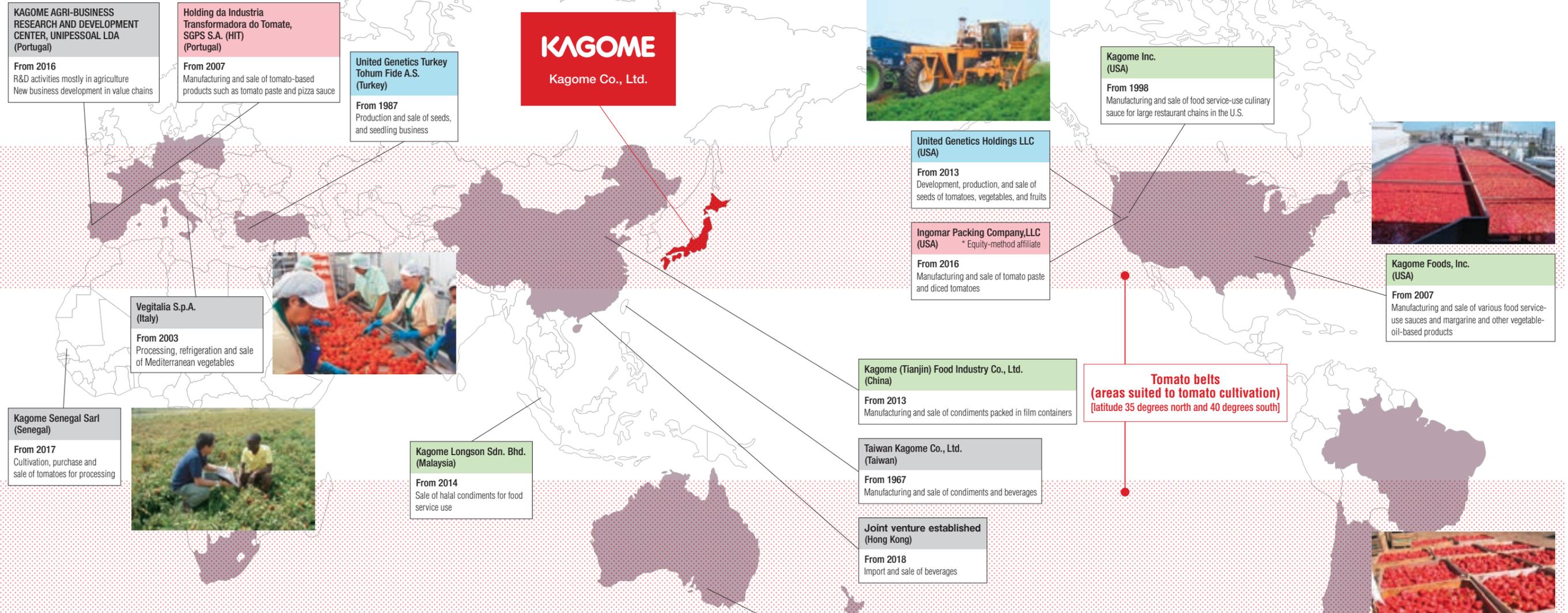
Secondary processing

 A familiar condiment made by adding sugar, brewed vinegar, salt, onions, spices, etc. to season tomato paste. There are tomato ketchup products made with organic tomatoes and high-lycopene tomatoes.

Tomato production, processing and sales facilities around the world

A network connected from seeds to table to deliver products around the world

Our strength is having facilities largely in the areas suited for tomato cultivation called the tomato belts (latitude 35 degrees north and 40 degrees south) and a business model based on vertical integration from seeds and cultivation to primary and secondary processing and sales. The Kagome Group consists of 41 subsidiaries and four affiliates, and we use the expertise we have acquired in Japan to survey numerous sites around the world, determine the optimal locations for cultivation, and operate business in a number of countries. Through this business, we contribute to the development of the countries and local producers while meeting the demands of local consumers.



Large fresh tomato cultivation facilities in Japan (domestic subsidiaries)



Kada Greenfarm Co., Ltd. (Wakayama)
From 2004
Growing Kagome brand fresh tomatoes primarily for the Chubu and Kansai regions



Hibikinada Greenfarm Co., Ltd. (Fukuoka)
From 2005
Growing Kagome brand fresh tomatoes primarily for western Japan



Iwaki Onahama Greenfarm Co., Ltd. (Fukuoka)
From 2005
Kagome's largest vegetable farm. Growing Kagome brand fresh tomatoes primarily for eastern Japan

Product development only possible through knowledge of tomatoes around the world

Tomatoes' quality characteristics vary significantly in different producing centers. As shown on the right, tomatoes in Japan and China are more sour, and those in Chile and Portugal are sweeter. The ability to apply these characteristics of the different producing centers to product development is one of the strengths of Kagome, which has a global network.

Examples of producing countries and characteristics of tomatoes for processing

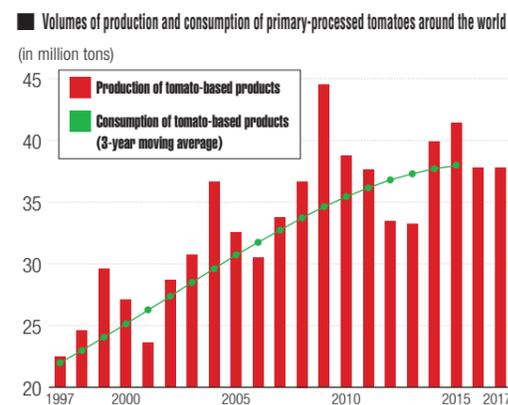
Producing country	Sweetness	Sourness	Flavor	Flavor Type	Major Processed Products
Japan	Medium	Strong	Medium	Sour	Paste, puree, juice
China	Medium	Strong	Medium	Sour	Paste, ketchup
Chile	Strong	Medium	Weak	Sweet	Paste, ketchup, juice
Italy	Medium	Medium	Strong	Flavor	Whole tomatoes, diced tomatoes, passata, paste
Turkey	Medium	Medium	Medium	Balanced	Paste, diced tomatoes, puree
USA	Medium	Medium	Medium	Balanced	Paste, juice, diced tomatoes, ketchup
Portugal	Strong	Medium	Medium	Sweet	Paste, puree, passata, juice
Australia	Strong	Medium	Medium	Sweet	Paste

Potential of tomatoes for processing and the outlook of Kagome's business

Demand for tomatoes for processing will increase as emerging economies grow

Impact of the tomato processing business on people around the world

A rising trend of consumption of tomatoes for processing



The production of primary processed products such as tomato paste, diced tomatoes and whole tomatoes in 2017 was 37,780 thousand tons. The consumption of tomato-based products has been temporarily modest due to the maturing of markets in developed countries such as the U.S. and a slowdown in the economic growth of emerging countries such as Russia, Africa and South America; however, a shift from raw tomatoes to processed tomato-based products is expected to occur as emerging economies develop, and the increase in consumption is expected to continue. To ensure growth from this situation, Kagome is actively involved in the development, etc. of new producing centers in promising regions.

* Source: WPTC (2017)

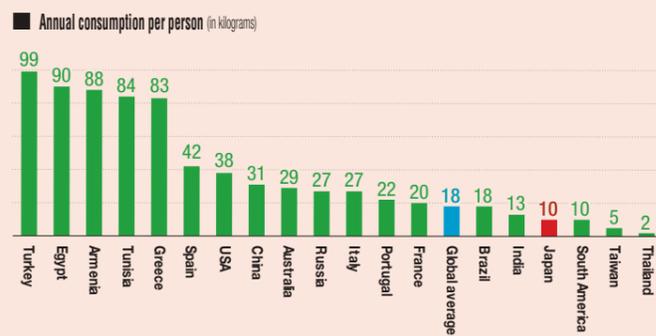
Approach to the solution of global social issues through tomatoes for processing



Kagome recognizes the importance of applying the Sustainable Development Goals (SDGs) to its corporate management. While diabetes and obesity have been rapidly increasing in the U.S. and Asian countries in recent years, people are still suffering from starvation and malnutrition in emerging countries such as those in Africa. To improve the situation, Kagome is working to solve social issues by implementing a business model based on consistent vertical integration from seeds for tomatoes for processing to the cultivation, processing and delivery of products.



Reference Global tomato consumption ranking by country



Top five countries, BRICS, VISTA, and countries related to Kagome from FAO Food Balance Sheets 2013 (as of Feb. 23, 2018)

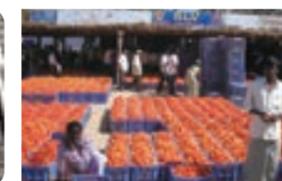
The annual tomato consumption per person worldwide is approximately 18 kilograms on average. The country with the highest tomato consumption is Turkey, where the annual consumption per person is approximately 99 kilograms. The country with the second highest consumption is Egypt, with approximately 90 kilograms per person, followed by Armenia in Eastern Europe, with approximately 88 kilograms per person. Japan is ranked 16th with approximately 10 kilograms per person.

* Ref.: From data released by UN Food and Agriculture Organization (FAO)

Efforts to develop the tomato industry in regions with potential growth

Kagome works to contribute to agriculture in Japan and abroad. In Japan, we are expanding the cultivation area of tomatoes for processing with the aim of growing our business while promoting the increased use of machine harvest to reduce the heavy burden of harvesting suffered by elderly producers of tomatoes for processing. Overseas, we are promoting farming that utilizes advanced technologies and are working to commercialize tomato cultivation in emerging regions where economic growth can be expected.

Aiming for market development and the development of the tomato industry



We will aim to achieve sustainable growth by solving social issues in the local communities through the optimization of the business model based on vertically integrated multi-regional value chains of tomatoes for processing.