Globally Important Agricultural Heritage Systems (GIAHS) Application

Minabe-Tanabe Ume System

Minabe-Tanabe Regional Association for GIAHS Promotion

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Summary

Name/Title of the Agricultural Heritage System:

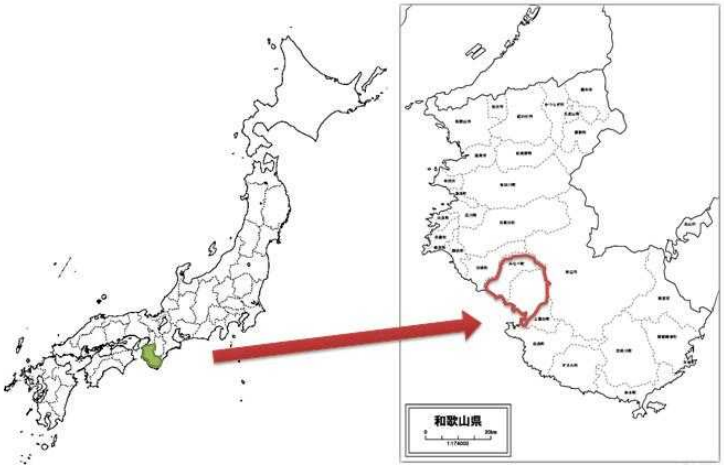
Minabe-Tanabe Ume System

Requesting Agency/Organization:

Minabe-Tanabe Regional Association for GIAHS Promotion

Country/location/Site

Minabe-Tanabe Region (Minabe Town, Tanabe City), Wakayama Prefecture, Japan



The area located near the southwestern coast of the Kii Peninsula, on the Pacific Ocean-side of Japan

Accessibility of the site to capital city or major cities:

The fastest way to reach to Minabe-Tanabe from Tokyo is by plane. The time to the nearest airport, Nanki-Shirahama Airport, is 90 minutes from Haneda Airport or 2 hours and 30 minutes from Narita Airport. It takes about 30 minutes from Nanki-Shirahama Airport to Minabe Town by car.

Approximate Surface Area: 256.68 km^2

Agro-Ecological Zone/s: Temperate, with rice paddies and orchards

Topographic features: Satoyama-type agricultural area with mudstone rudaceous mountainsides, rivers flowing among them, and rice paddies and other fields along the valleys.

Climate Type: Temperate and rainy climate with annual average temperature of 16.6°C, annual precipitation of at least 2000 mm.

Approximate Population: 79,563Individuals (2010)

Main Sources of Livelihoods: Agriculture, forestry, food manufacturing, tourism.

Ethnicity/Indigenous population: Not applicable.

Summary Information of the Agricultural Heritage System

As both food and medicine, ume [*Prunus mume*, Japanese apricot] have been a highly valued crop in Japan from about 1300 years ago. Pickled ume, called *umeboshi*, keep well and have excellent medicinal effects including food poisoning prevention and recovery from fatigue, and have been consumed on a daily basis as a Japanese side dish.

The Minabe-Tanabe ume system is a unique system which has sustainably produced high-quality ume by making use of slopes with rudaceous soil, which is poor in nutrients.
The production of ume in this region comes to about 44,000 t annually (2012), accounting for about 50% of Japan's total production. Yield per unit area is high, at about 1.5 t per 10 a, which is about twice that of Japan's other ume-producing districts.

The steeply inclined mountainous parts of this site with their rudaceous soils could not be used for the usual kinds of agriculture and forestry. Therefore, to make a living, about 400 years ago people started cultivating ume, which can be produced even under these conditions. They have also maintained mixed forests as coppice forests. By maintaining coppice forests near ume orchards and along the ridges of steep slopes, people have endowed them with functions including watershed conservation, nutrient replenishment, and slope collapse prevention. In this way, they have sustained ume production. Allowing grass to grow in ume orchards prevents soil drying and erosion, and the mowed grass is returned to the soil to fertilize the ume.

Honeybees that live in the coppice forests help pollinate the ume trees, and the ume aid honeybee propagation in the early spring, when few flowers are blooming, by providing them with valuable nectar.

While sustaining and expanding ume cultivation, people have continually improved ume, nurtured diverse genetic resources, and created outstanding varieties that are adapted to this site, of which the Nanko variety is representative. People have refined techniques for ume processing as well as production, developing worry-free and safe processed foods that meet modern needs, such as flavored *umeboshi* with reduced salt, health foods that use ume ingredients, and other healthful applications.

At the same time, people created a prime grade of charcoal called Kishubinchotan charcoal by using tree species such as *Quercus phillyraeoides* from their coppice forests, and devised a selective-cutting method of coppice forest management, not found in other places, which can regenerate the trees quickly.

The coppice forests and ume orchards that expanded in this manner formed a unique and beautiful landscape. The flow of water from coppice forests to ume orchards to rice paddies and fields has maintained a habitat for a large and diverse variety of flora and fauna, and has enabled the cultivation of ume and many other agricultural crops. The nature-friendly production activities of this district have protected people's livelihoods, while making their lives spiritually gratifying and nurturing local bonds and culture. An ume offering festival based on an old story and which thanks the spirits for the harvest, a traditional culinary culture which uses ume, and other features constitute an ume culture that is unique to this site and valuable to the world as well.

The accumulated efforts of people to carefully use the limited resources of the locality established a sustainable agricultural system based primarily on ume, and have now created an ume industry said to be worth about ¥70 billion through the coordination of diverse sectors such as production, processing, distribution, and tourism, thus bringing stable local employment. Sustainable agriculture and livelihoods are considered important in the world. The agricultural system of this site is a model that embodies them.

Minabe-Tanabe Ume System

The Minabe-Tanabe Ume System is an agricultural system that has made use of rudaceous slopes poor in nutrients by placing ume orchards among them whileconserving coppice forests. In doing so, it has sustainably produced high-quality ume.
By using satoyama slopes for ume orchards and maintaining the coppice forests surrounding them, people endowed the forests with functions including watershed conservation and slope collapse prevention. The effective use of local resources, such as the pollination mutualism between coppice forest-dwelling Japanese honeybees (Apis cerana japonica) and ume trees and the harboring of genetic resources created through the long history of ume cultivation, has sustained agriculture which centered around ume cultivation and supported their livelihoods

1. Food and livelihood security

- ○ Ume industry supports livelihoods
- • About 70% of the working population engages in ume production or related industries
- • Production, processing, tourism, and other sectors are linked in the approximately ¥70 billion ume industry
- ○ Charcoal industry creates Kishubinchotan charcoal
- ○ Production of diverse agricultural products including rice, vegetables, and citrus fruit

2. Biodiversity and ecosystem function

- ○ Biodiversity maintained by coppice forests, ume orchards, and the waterside environment
- ○ Pollination mutualism between ume trees and the Japanese honeybee
- ○ Agricultural diversity
- • Diversity of ume cultivation
- • Various agricultural products to combine with ume in diversified farming

3. Knowledge systems and adapted technologies

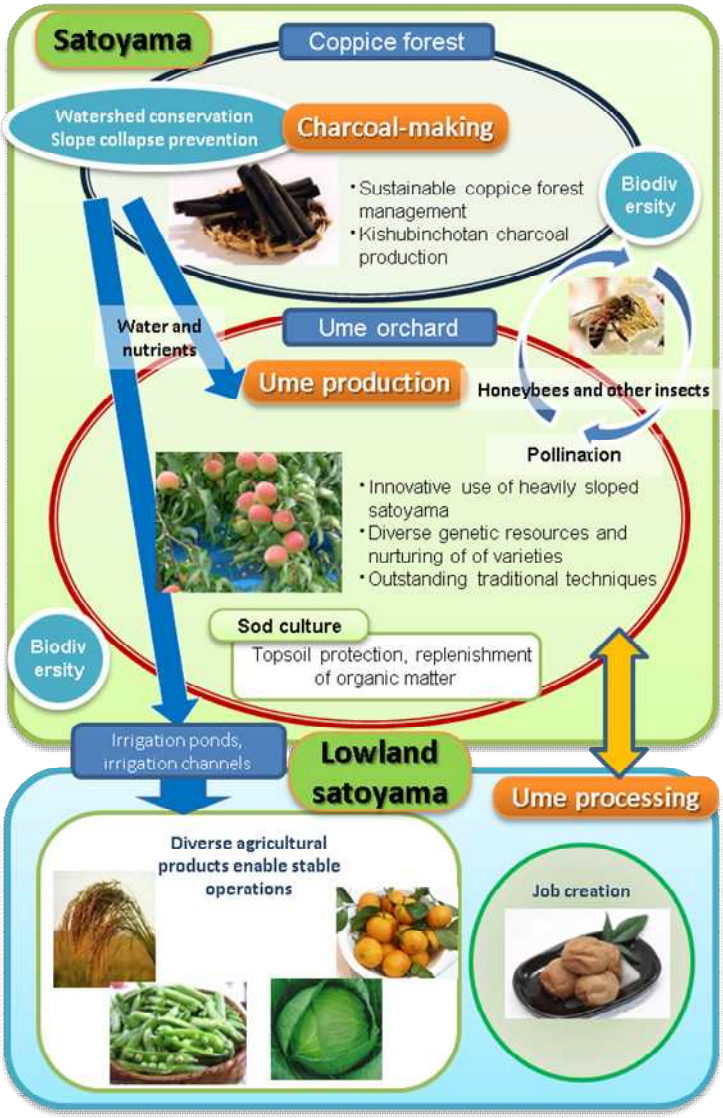
- ○ Diverse genetic resources and nurturing of excellent varieties
- ○ Traditional techniques of ume cultivation
- • Tree pruning, honeybee pollination, etc.
- ○ Locally developed umeboshi processing techniques
- ○ Unique "selective cutting" coppice forest management technique

4. Cultures, value systems and social organizations (Agri-Culture)

- ○ Ume-related festivals and events
- ○ Traditional ume culinary culture
- ○ Local bonds fostered by ume

5. Remarkable landscapes and features of land and water resources management

- ○ Seasonal changes in ume orchard scenery
- ○ Use of steep topography by means of coppice forests and ume orchards
- • Watershed conservation and disaster prevention functions of coppice forests
- • Topsoil protection and other functions of sod culture in ume orchards
- ○ Unique coppice forest management based on "selective cutting"



Minabe-Tanabe Ume System

Globally Important Agricultural Heritage Systems (GIAHS) Application

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I. Characteristics of the proposed GIAHS

It is said to be at least 1300 years ago that the Japanese started using ume [*Prunus mume* Siebold & Zucc., Japanese apricot], which have been valued as food and medicine. Ume pickled in salt are called *umeboshi*. They can be preserved at room temperature, possess excellent medicinal effects such as preventing food poisoning and promoting recovery from fatigue, and have been consumed on a daily basis as an indispensable Japanese side dish. Ume are in the spotlight as a health food as well, as studies in recent years have confirmed their effects including recovery from fatigue and suppressing blood sugar elevation.

Global (or national) importance

a) Diverse ume genetic resources and nurturing of outstanding varieties

This area produces about 44,000 t (2012) of ume per year, accounting for approximately 50% of Japan's total ume production. Approximately 400 years of ume cultivation have fostered diverse ume genetic resources. By making continual improvements to these genetic resources, the people have produced many outstanding varieties that are adapted to the climate and soil quality of this site.

Table 1. Ume varieties grown in the Minabe-Tanabe area.

Category	variety	Place of origin/history
Native varieties	Nanko	Wakayama Prefecture
	Gojiro	Wakayama Prefecture
	Kotsubu Nanko	Wakayama Prefecture
	Kairyo Uchidaume	Wakayama Prefecture
	Kaidarewase	Wakayama Prefecture
	Hakuo	Wakayama Prefecture
	Benio	Wakayama Prefecture
	Kinugasa	Wakayama Prefecture
	Minabe 21	Bred by Minabe Town
	Purple Queen	Bred by farmers in Tanabe City; bud mutation of Hakuo
	Purple Nanko	Bred by farmers in Tanabe City; bud mutation of Nanko
Local native variety used	NK14	Bred by Wakayama Prefecture; cross between Nanko and Kensaki
Crossbred varieties (*Note)	Toko	Bred by Wakayama Prefecture; cross between Nanko and Jizo-ume
	Miss Nadeshiko	Bred by farmers in Tanabe City; "Miss Nadeshiko" is a trademark
	Tsuyuakane	Bred by the NARO Institute of Fruit Tree Science; cross between the plum Kasaharahatankyo and Yosei
	Hachiro	Bred by the NARO Institute of Fruit Tree Science; naturally hybridized seedling of "Jizo"
Varieties of other localities	Suiko	Bred by the NARO Institute of Fruit Tree Science; cross between Gessekai and Baigo
	Shirokaga	Unknown; a long-cultivated variety
	Juro	Kanagawa Prefecture
	Oshuku	Tokushima Prefecture
	Koshu Saisho	Nara Prefecture
	Orihime	Saitama Prefecture
	Ryukyo Ko-ume	Nagano Prefecture

*Note: Varieties that were crossbred using native varieties of this site as one or both of the mother plants.

At present, farmers cultivate mainly 23 varieties (although many other native varieties are also grown in small quantities). Sixteen of these are either varieties native to this area or bred varieties that inherit its genetic resources (Table 1). In particular, the Nanko variety, which was selectively bred during the years 1950–1955 through cooperation among local leading farmers, Minabe High School, and other parties, has a high yield, a small seed, much flesh, thin skin, and other excellent characteristics, making this variety representative of contemporary Japanese ume.

There are said to be at least 400 ume varieties worldwide. The Japanese Apricot Laboratory, Wakayama Fruit Tree Experiment Station in Minabe Town (below, "Wakayama Fruit Tree Experiment Station") currently preserves the diverse genetic resources of 121 varieties, including some which are not cultivated, and is using these to conduct research and development on new varieties for the future.

We believe that ume are a useful crop that can promote the health of people not only in Japan but also worldwide, and that these genetic resources are globally valuable.

b) Use of sloped land for coppice forests and ume orchards

Because this site has little land suitable for rice paddies, for about 400 years people have used local satoyama* to produce ume as a way to make a living. At present there is some ume production on flat land in a bid to stabilize farming operations, but most ume cultivation makes use of satoyama slopes.

With its rudaceous soil and many sloped surfaces, the satoyama w as well-suited for ume cultivation given its good drainage. However, the topsoil was shallow and tended to crumble easily.

The coppice forests left above and around ume orchards were soundly maintained by charcoal-makers, and have supported ume cultivation by conserving watersheds and preventing slope collapse. Additionally, the functions of soil water retention and soil runoff prevention in the ume orchards were enhanced by allowing the growth of grass, which was then mowed and used to fertilize the orchards. Furthermore, building irrigation ponds in valleys to store water made it possible to produce diverse crops including wet rice and vegetables in the lowland satoyama (Figure 1).

As this shows, although the satoyama of this area was considered unsuitable for agriculture and forestry, people devised a land-use system that overcame those conditions by making Kishubinchotan charcoal with

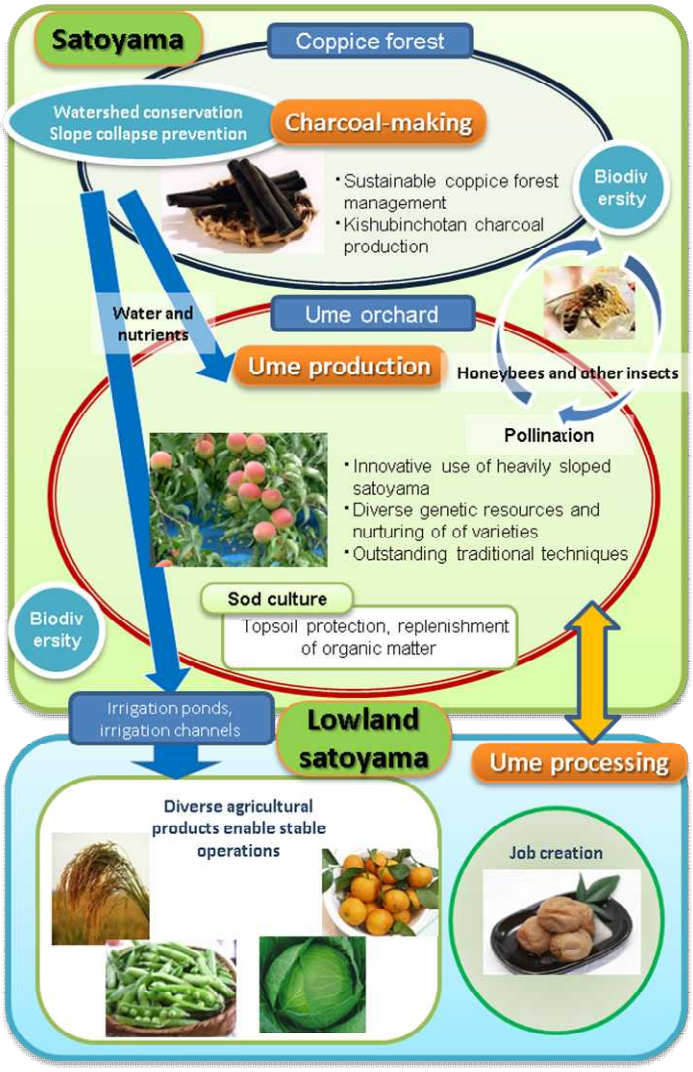


Figure 1. Land use that takes advantage of satoyama slopes.

Quercus phillyraeoides (Ubame-Gashi in Japanese; Gashi means Oak) trees from coppice forests, and in the orchards growing Nanko ume, which are representative of Japan. Both are recognized for their excellent quality and sell for high prices. As such, ume production and charcoal-making are important industries that support the livelihoods of the local populace. This is globally significant in that, even under the poor conditions of rudaceous soil and highly sloped land, the people have carried on sustainable agriculture by using the wisdom and innovation of their forbears.

*satoyama: traditional rural landscape of Japan consists of a mosaic of mixed forests, rice paddies, dry fields, grasslands, streams, ponds and other landscape components for agriculture. These landscape components connect each other through bio-resource flows and utilizations by local farmers.

c) Pollination mutualism of ume trees and honeybees

Many ume varieties of this site cannot self-pollinate, which necessitates planting of pollinizers* in orchards. Yield and quality are heavily influenced by the activity of insect pollinators. In this site, where mixed forests have been left as coppice forests, Japanese honeybees (*Apis cerana japonica*) are very active and have long been useful for pollinating ume trees.

At the same time, ume trees are a valuable source of nectar for honeybees because they bloom in early spring and help the bees reproduce. Furthermore, the *Eurya japonica*, cherry varieties, *Castanopsis*, and other coppice forest trees, which flower after ume trees, are also sources of nectar and pollen. The honeybee population is maintained by the year-round supply of nectar and pollen from a large variety of trees.

Honeybees, as pollinators, are an important partner in this area, where livelihoods depend mainly on ume cultivation. Therefore, to protect honeybees, no agricultural chemicals are applied when ume trees flower.

Today, securing the stability of honeybee populations is considered vitally important for the global food supply. For this reason, the agricultural system of this site is globally important for maintaining the pollination mutualism of honeybees with ume orchards and coppice forests.

*pollinizers: To make varieties incapable of self-pollination bear fruit, these varieties are planted in orchards as pollen parents. For "Nanko," the primary variety of this site, pollinizers make up about 20% of the total trees.

d) Outstanding traditional techniques

i) Traditional techniques for ume production

This ume yield of this site is approximately 1.5 t/10 a, which is about twice that of other producing areas in Japan, thanks to the breeding of excellent varieties as described above, and to the traditional techniques detailed below.

Specifically, the unique techniques established at this site include a unique harvesting method for gathering the ume with nets placed under the trees, which was devised for purposes such as streamlining the harvesting of ripe ume; pruning methods, tailored to the characteristics of each variety, that make trees fruit consistently year after year; and pollination of ume by taking advantage of the mutualism with honeybees.

The combination of these techniques, which were perfected through the quest for ume quality and yield, is globally unique. This is described in more detail below.

ii) Locally developed ume processing techniques

Umeboshi had become a specialty of this site by around the year 1700. Because *shiraboshiume* (salt-pickled ume) and *shisozukeumeboshi* (perilla-flavored pickled ume) were already widely consumed at that time, it is likely that this site had possessed outstanding ume

processing techniques for a long time. In the 1970s an *umeboshi* processing company developed "flavored *umeboshi*" such as "bonito ume," [Note] which increased consumption and contributed greatly to the advancement of the ume industry because the products had lower salt and were easier to eat. Furthermore, techniques for making beverages such as ume liqueur, which is very popular worldwide; techniques for using ume vinegar, which is a by-product of *umeboshi* production, for animal feed; and other techniques that arose and developed along with ume production in this site are driving ume processing in Japan.

* Bonito: "Bonito ume" are *umeboshi* with reduced salt and flavoring based on dried bonito shavings.

iii) Sustainable coppice forest management techniques

Unique coppice forest management techniques developed to obtain a stable supply of *Quercus phillyraeoides* and other tree species for making Kishubinchotan charcoal. In particular, "selective cutting," which was devised in the 1700s, is a technique outstanding in both productivity and sustainability because it allows logging about once in 10 years. In contrast, clearcutting can be done only once in 30 to 40 years.

In recent years, damage due to deer feeding on post-cutting sprouts has emerged as a problem in Japan's coppice forests. Given that selective cutting leaves an appropriate amount of trees with thin trunks, there is less invasion by deer than with clearcutting in which all trunks are cut. In addition, the sprouts have strong regenerative capacity even if they are eaten. Therefore, this coppice forest management technique is garnering attention also for its mitigation of deer damage.

e) Remarkable satoyama landscape

i) Seasonal changes in ume orchard scenery

The expansive ume orchards and the coppice forests, which are positioned so as to surround the orchards, amount to 4000 ha and present a beautiful landscape throughout the seasons.

In February when the ume trees flower, the blossoms color the mountains as far as the eye can see, and when viewed from inland, the beautiful scenery against the blue Pacific Ocean leaves an unforgettable impression (Photo 1). In early summer, the new ume leaves and the grass growing below harmonize with the surrounding coppice forest, clothing the mountains uniformly in vivid green (Photo 2). From summer through autumn, the ume orchards change color to yellow and then brown, and in winter, ume orchards adorned with snow create a fairyland scene that is seemingly out of an ink painting.

This landscape is a valuable tourism resource, especially with about 50,000 tourists visiting every year when the ume blossoms emerge. Purchases of ume products by tourists are a supplementary source of income for farmers and help stabilize their operations.

Photo 1. Ume trees in bloom (February).

As noted previously, the rudaceous soil and highly sloped land make this site unsuitable for

ordinary farming, but under such disadvantageous conditions the local inhabitants focused on ume, and through continued effort over the centuries built a system that can maintain their livelihoods with agriculture. The result is a sustainable agricultural system with a beautiful landscape where many kinds of flora and fauna coexist.

Photo 2. Coppice forest and ume orchard (April).

1. Food and livelihood security

Because rice farming does not offer much income at this site, about 400 years ago people used the forests and mountain slopes for ume production and processing, and with their preexisting charcoal making they supported themselves by establishing an agricultural system sustainable in terms of both the environment and livelihood.

a) Ume industry supports people's livelihoods

Ume production for 2012 in Minabe-Tanabe was 44,000 t on 4090 ha (Figure 2) for value of at least ¥13 billion (estimated from the value of ¥15.9 billion for Wakayama Prefecture), accounting for over 50% of total domestic production and making this Japan's biggest producing area. According to the 2010 World Census of Agriculture and Forestry, 3343, or 96%, of the site's 3477 farming families were growing ume, making ume a vital crop that supports the locality.

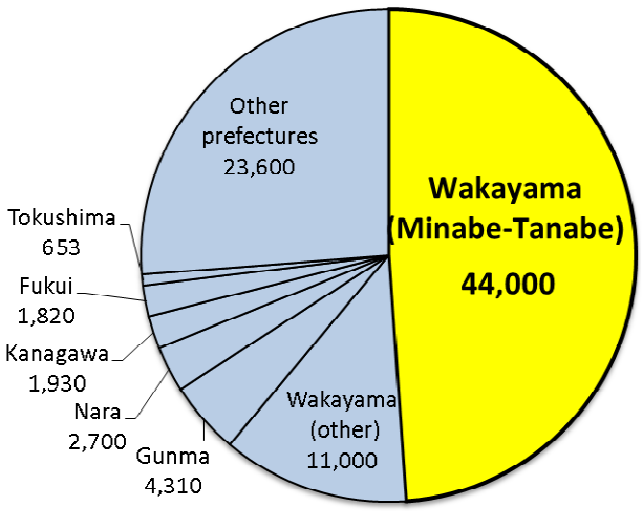


Figure 2. Japan's ume production by prefecture (t, 2012)

Nanko, which is the primary variety of this site, has particularly excellent qualities for *umeboshi* such as high production, thin skin, and much flesh. It has played an important role in establishing the ume brand.

Most of these ume are cultivated on slopes, but in recent years some have been grown on flat land. These are harvested sooner than ume on slopes and are also easier to pick by hand. They are shipped mainly as fresh produce and contribute to stable farming income.

Photo 3 shows the ume production-related work of farmers at this site. There are various tasks throughout the year; some characteristics of the work are that two harvests occur per year for unripe ume shipped as fresh produce and ripe ume used for *umeboshi*, and that the growers themselves do the primary processing of *umeboshi* (salt pickling and sun drying). By doing the primary processing themselves and making the ume preservable, it has become possible for farmers to vary shipping times, avoid low prices caused by bumper crops, and stabilize their income. Making primary processing the normal practice also necessitates tasks such as sorting after pickling and processing, which has created employment opportunities for not only farmers, but also local elderly people and women.

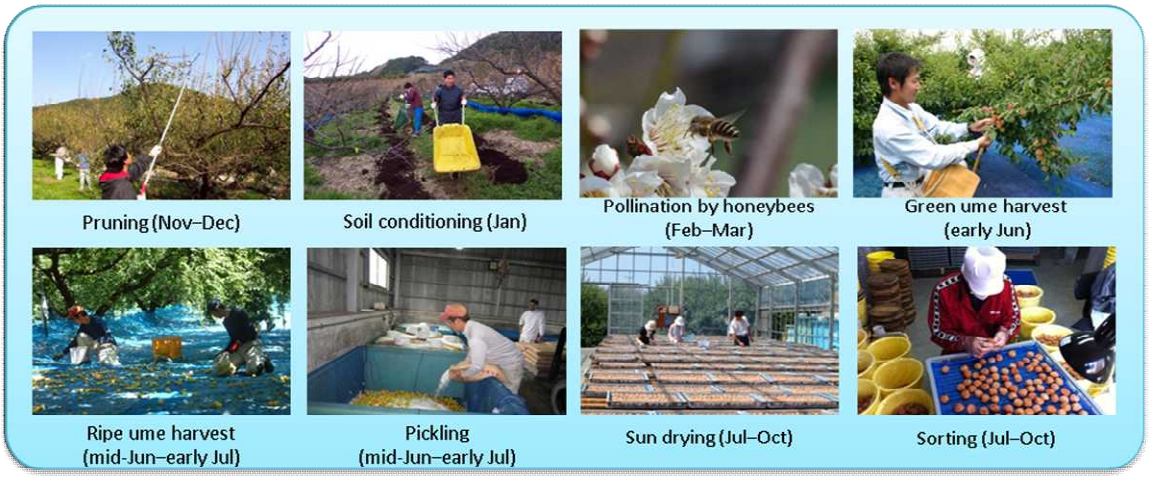


Photo 3. Tasks performed throughout the year by ume farmers.

Umeboshi processing here comprises primary processing (traditional *shiraboshiume* processing) by farmers and subsequent secondary processing (flavored *umeboshi* processing) performed by *umeboshi* processors. Many of the ume processors were originally ume growers who around the year 1900 also became involved in processing and then later specialized in processing and grew their businesses. They continue to evolve today as well by not only making *umeboshi* but also by developing ume liqueur and other new products, as well as devising ways to reuse ume vinegar and ume flavoring waste liquid. The more than 200 ume processing facilities here employ approximately 3000 people. Production, processing, and other ume-related industries are said to have an annual turnover of about ¥70 billion, and 70% of the workers residing at this site are involved with ume in some way. The ume-related industries here contribute to the local economy and employment as a way to make a living, thereby supporting the livelihoods of the people.

Additionally, the expansive ume orchard landscape is a valuable tourism resource, especially with about 50,000 tourists visiting every year when the ume trees flower. Purchases of ume products by tourists are a supplementary source of income for farmers and help stabilize their operations.

The two municipalities of this area have offices specializing in promoting the ume industry, with an “Ume Section” in Minabe Town and an “Ume Promotion Office” in Tanabe City. This also demonstrates how important ume are to the local economy.

b) Diverse agricultural products support stable operations

Although little of the lowland satoyama is flat land, most of it is used to grow rice in paddies as well as cabbage, broccoli, and garden peas outdoors. In recent years, ume farmers have been growing peas, strawberries, and other crops in greenhouses as important side crops (Photo 4).

Photo 4. Diverse agricultural products.

In Tanabe there are also many fruit orchards on slopes, producing citrus fruit, Japanese plums, and other fruit in addition to ume (Photo 4).

As this shows, although ume production is central, farmers take advantage of the mild climate and topographical conditions to produce diverse agricultural products as a means of leveling farming tasks and distributing

management risks, thereby providing for stabilization of agricultural operations (Table 2).

Table 2. Non-ume agricultural products of the Minabe-Tanabe region (shipping figures are from FY2012).

Category	Item	Tons shipped	Category	Item	Tons shipped
Rice	Rice	2,382	Fruits	Citrus fruits	
Vegetables	Garden pea	626		*Citrus unshiu*	12,689
	Tomatoes	125		Kiyomi	527
	Cabbage	93		Hassaku	468
	Strawberries	80		Ponkan	464
	Daikon radishes	77		Amanatsu	445
	Broccoli	57		Dekopon	327
	Eggplant	31		Sanbokan	174
	Kinusayaendo (a pea variety)	19		Seminole	22
	Cucumbers	15		Japanese plums	233
	Spinach	13	Flowering plants	Statice	3,159,000 stems
	Chinese cabbage	13		Baby's breath	1,544,000 stems

Note: Vegetables are those shipping 10 t or more; strawberries are estimated from cultivated area.

c) Charcoal industry creates Kishubinchotan charcoal

The hard charcoal* produced at this site comes to 482 t (2012) annually, accounting for 15% of Japan's total production (Figure 3). Eighty-five producers made ¥220 million worth of charcoal, making charcoal manufacturing an important industry in this mountainous area (figures are those for Minabe Town and Tanabe City). In recent years, young people have come from other areas, including other prefectures, to make charcoal. They now number 12 individuals.

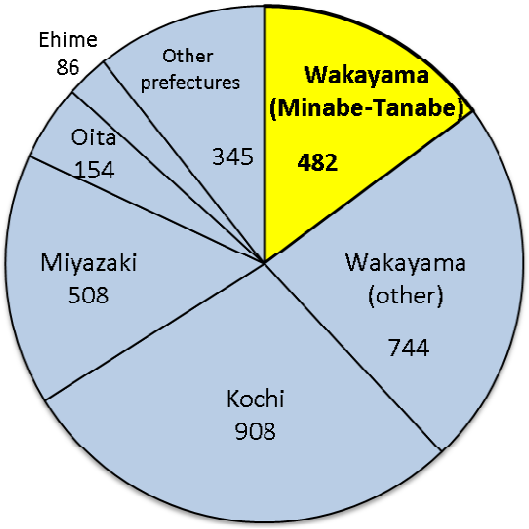


Figure 3. Japan's hard charcoal production by prefecture (t, 2012).

Although *Quercus phillyraeoides* and other species in the coppice forests are hard and curved, and therefore unsuitable as building materials, from at least 400 years ago, a charcoal industry that took advantage of this hardness was thriving. High-quality hard charcoal, which is produced with advanced techniques, is characterized by long-lasting combustion at a constant temperature and is known as "Kishubinchotan." It is highly regarded as the finest fuel for grilling baked foods such as grilled eel (Photo 5). In recent years, it has been sold for non-fuel uses such as in improving the quality of cooked rice, water purification and deodorizers; as well as after being manufactured into interior items such as wind chimes. This has created new added value in ways suited to the demands of modern life.

Photo 5. Binchotan charcoal.

* hard charcoal : Charcoal includes hard and soft kinds. Soft charcoal is produced by closing all kiln apertures when carbonization is finished to block the air supply, and removing the charcoal after it is extinguished and cooled inside the kiln. In contrast, making hard charcoal involves opening the kiln apertures after carbonization to admit air and burn off the residual carbon monoxide, and subsequently removing the charcoal. Hard charcoal has a higher ignition temperature than soft charcoal and lights with difficulty, but once ignited it burns at a constant temperature for a long time. The main wood species are beech-family trees for hard charcoal and trees such as *Quercus acutissima* (Japanese Chestnut Oak) for soft charcoal.

2. Biodiversity and ecosystem function

In addition to satoyama ume orchards and coppice forests, land use involves irrigation ponds, rice paddies, and the irrigation channels that connect them, as well as other ways of advantageously using the topography, geology, and regional natural vegetation. As a result, the flora and fauna are provided with appropriate conditions and habitat, which maintain a regional ecosystem that nurtures diverse organisms (Figure 4).

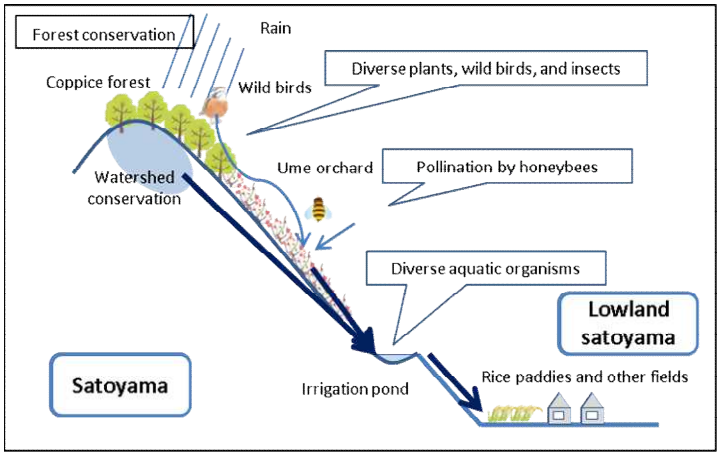


Figure 4. Land use and biodiversity.

Past studies have documented many birds of prey, which are the top-level predators of the ecosystem, such as *Accipiter nisus* (European Sparrow Hawk), *Accipiter gentilis* (Northern Goshawk), and *Nisaetus nipalensis* (Mountain Hawk-Eagle), and a 2014 field survey confirmed the presence of *Butastur indicus* (Grey-faced Buzzard Eagle) and *Pernis ptilorhynchus* (Oriental Honey Buzzard). These are all endangered species listed in the Ministry of Environment's Red Data Book.

a) Biodiversity and multifunctional role of coppice forests

Ume orchards and coppice forests are arranged by fully considering the inherent topography and geology of the land. Mixed forests that remain along the mountain tops and sides have been sustainably managed as coppice forests, which serve as habitats for diverse flora and fauna. A *Quercus phillyraeoides* forest has been preserved in the Ishigami district of Tanabe City's Kamihaya area (Photos 6, 7); this forest is a habitat for wild plants typical of satoyama, such as *Rhododendron weyrichii*, *Lilium japonicum* (Japanese Pink Lily), and *Clematis terniflora* (Sweet Autum Clematis). *Strix uralensis* (Ural Owls), which prey mostly on rodents, and birds including the *Zosterops japonicus* (Japanese White-eye), which gather among the ume blossoms and *Camellia japonica* (Common camellia) flowers, have been observed along the footpath built in this forest.


Photo 6. *Quercus phillyraeoides*.


Photo 7. Satoyama coppice forest.

In addition to *Quercus phillyraeoides*, which is well-known as wood for Kishubinchotan charcoal, the forests also produce beech family trees, *Lyonia ovalifolia*, *Photinia glabra*, and many other species which are likewise used for

charcoal. The coppice forests have been managed using selective cutting and other techniques since the 1700s, a practice that has preserved a well-lit forest interior suited as a habitat for diverse flora and fauna. *Citrus tachibana*, a rare wild tree of the citrus family whose habitat in Wakayama Prefecture is very limited, grows wild along slope ravines and on cliffs (Photo 8), and the epiphyte *Sedirea japonica*, designated an endangered species, has also been discovered.

Photo 8. *Citrus tachibana* (Tachibana in Japanese) .

Coppice forests near dwellings and farmland were managed to produce wood for Kishubinchotan charcoal, but because the watershed conservation function was considered important in forests deeper in the mountains away from villages, people have long avoided large-scale clearcutting and conversion to plantations. In addition to coppice forests comprising mainly *Quercus phillyraeoides*, there are forests consisting of diverse species. In the mountain recesses of Minabe Town's Kiyokawa district, one finds a vegetation landscape where *Castanopsis sieboldii* grows in a mixed community with *Quercus acuta* (Japanese evergreen oak) (Photo 9). Although they were used as coppice forests in the past, the forest succession has currently proceeded to a near-climax state.

Photo 9. Coppice forest deep in the mountains.

Rain falling on these forests and ume orchards is first received by vegetation and soil, then stored in ponds and released to downstream rice paddies, where it raises diverse crops. At the same time, it serves as a valuable water source that fosters biodiversity.

b) Biodiversity of farmland waterside environment

Because obtaining river water for irrigation has been difficult at this site, people have long built irrigation ponds in intermontane valleys. Thee ponds can be found in 240 locations. The rain falling in mountain recesses and coppice forests circulates as it waters the ume orchards on its way to the ponds, then waters the lowland-satoyama rice paddies and farmland, and fosters many organisms (Photos 10, 11).

These waterside environments are important habitats, of course, for freshwater fish, but

Photo 10. Irrigation pond.

Photo 11. Rice paddies.

also for amphibians and other aquatic organisms, and for the creatures that prey on them. In addition to amphibians listed in the Red Data Books of the Environment Ministry and Wakayama Prefecture, such as *Hynobius nebulosus*, *Cynops pyrrhogaster*, *Pelophylax nigromaculatus*, and *Rana rugosa*, there are many insects including Aeshnidae dragonflies, and Odonata dragonflies including *Davidius nanus*, *Mnais pruinosa*, *Orthetrum albistylum speciosum*, *Orthetrum triangulare melania*, and *Orthetrum japonicum japonicum*.

Additionally, *Nymphoides coreana* (Pygmy Water Lily), *Brasenia schreberi* (Water-Shield), *Ottelia alismoides*, and other rare aquatic plants have been confirmed in the irrigation ponds. These ponds were selected among the Environment Ministry's "500 Important Wetlands of Japan" as the "Farm Ponds in Tanabe-shi and Hidaka-gun." They have also been designated as a plant community important in terms of conservation by the revised Wakayama Prefecture Red Data Book.

c) Pollination mutualism between ume trees and honeybees

Many of the ume varieties of this site cannot self-pollinate, which necessitates the mixed planting of pollinizers. Therefore yield and quality are greatly influenced by the activity of insects that assist pollination. Few *Cryptomeria japonica* (Japanese cedar) or *Chamaecyparis obtusa* (Japanese cypress) are planted at this site, where mixed forests have been left for use as coppice forests. Japanese honeybees are therefore very active and have long been useful in pollinating the ume (Photo 12). Japanese honeybees have the characteristics of more actively visiting flowers at low temperatures than Western honeybees (*Apis mellifera*) and of visiting flowers even in rainy weather. This is helping to raise the fruiting rate of ume, which flower in early spring when temperatures are low.

Photo 12. Ume blossoms and Japanese honeybees.

Generally, honeybees cannot find enough nectar sources in early spring and summer, but this site offers not only ume, which flower in early spring, but also coppice-forest trees such as *Eurya japonica*, cherry trees, and Castanopsis trees, which flower after ume and are a valuable nectar source for honeybees. Honeybee populations are maintained by the year-round supply of nectar and pollen from diverse plants.

Photo 13. "Gora"
(hive boxes for Japanese honeybees).

Honeybee hive boxes called "gora," made by hollowing out logs (Photo 13), have been placed along the edges of coppice forests, which adjoin the ume orchards, and the traditional form of beekeeping continues to this day. According to filings as of January 2014, there were 133 Japanese honeybee colonies being kept by 24 households.

Photo 14. Ume blossoms and *Zosterops japonicus*.

Ume blossoms are visited by not only honeybees and other insects, but also by birds such as *Zosterops japonicus* (Photo 14). Like

ume orchards, the coppice forests that surround them are also important habitats for organisms. Thus, conserving the coppice forests is a prerequisite for maintaining ume cultivation.

d) Agricultural biodiversity

i) Ume cultivation diversity

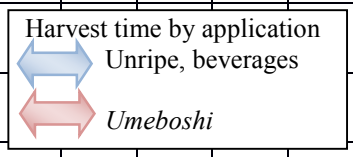
As noted previously, mainly 23 ume varieties are grown in this site (many other native varieties are grown in small amounts). Of these, 16, including primary varieties such as Nanko and Gojiro, are unique to this site, being either produced from the many genetic resources accumulated over the course of more than four centuries or crossbred using these varieties.

Although this site's main variety is Nanko, farmers cultivate other varieties in combination as pollinizers and as a way to spread out the work of harvest times or stabilize their operations. Principal varieties other than Nanko include Gojiro, which is harvested early and suited to making beverages, as well as Hakuo and Benio, which are small varieties harvested earliest and used as pollinizers for Nanko. In addition, varieties bred in recent years are being increasingly grown. These include NK-14, whose fruiting is more stable than that of Nanko and which is suitable for both *umeboshi* and beverages, as well as Purple Queen and Tsuyuakane, which are a beautiful crimson color, rich in polyphenols*, and suitable for processing beverages (Table 3). Even the same variety may be used in different ways—shipped unripe (ume are hand-harvested from trees; harvest is early) or used to make *umeboshi* (ripe ume are harvested after they fall from trees; harvest is late)—so as to spread out the work of harvesting and stabilize sale prices (Table 3).

* polyphenol: Polyphenols are found in vegetables, fruit, tea, spices, and other foods. They eliminate oxygen radicals, which are considered to cause cancer and lifestyle diseases.

Table 3. Ume varieties of Minabe-Tanabe site and their harvest times by application.

Varity	Application	May			June			July		
		Early	Mid-month	Late	Early	Mid-month	Late	Early	Mid-month	Late
Small ume (Hakuo, Benio)	Unripe, for *umeboshi*									
Purple Queen	Unripe									
Gojiro	Unripe, for beverages									
NK14	Unripe, for *umeboshi*									
Kairyo Uchidaume	Unripe, for *umeboshi*									
Kaidarewase	Unripe, for *umeboshi*									
Nanko	Unripe, for beverages and *umeboshi*									
Kotsubu Nanko	Unripe, for *umeboshi*									
Tsuyuakane	Beverages									



Thus, dispersing harvest times according to variety and application is also an effective

way of dealing with climate change and shifting business conditions, thereby improving the resilience of the food supply and livelihood means as well. Although Typhoon Songda struck Japan in late May 2011 and caused heavy damage including fallen ume and broken branches, producers were able to minimize their losses because the early-maturing ume had already been harvested and escaped damage and because many of the fallen ume were used to make beverages and *umeboshi*.

ii) Various agricultural products to use in diversified farming

Other than ume, this site produces a broad range of 67 agricultural products including fruits, vegetables, flowers, and rice (Annex, Photo 15). Water from irrigation ponds is used to grow rice, cabbage and broccoli outdoors, and in upland fields to grow strawberries and pea crops in greenhouses. Many citrus varieties such as *Citrus unshiu* are cultivated on slopes in Tanabe City. These items are mainly grown as diversified farming crops with ume, and are useful in stabilizing farming operations.

Photo 15. Farmers' market featuring a large variety of agricultural produce.

3. Knowledge systems and adapted technologies

a) Cultivation techniques for high-quality ume

The various ume cultivation technologies adapted to this site's natural conditions were established through a long history of cultivation, and currently are far superior to other producing districts in terms of both yield and quality (unit price).

i) Nurturing of outstanding varieties by concerted effort of the community

Ume cultivation in this site continued for approximately 300 years until the early 1900s by means of seedling propagation (growing plants from seeds). This process fostered diverse genetic resources that served as the foundation for breeding excellent varieties.

Although farmers raised a wide range of varieties here until the early 1900s, the desire for stable production of high-quality ume created a rising trend toward breeding better varieties.

Amidst this trend, in 1950 a "Varieties Selection Committee" of leading farmers was organized in the Minabe area. Chaired by Katsutaro Takenaka, a teacher at the local Minabe High School, the committee started a study of 37 local varieties and the selection of outstanding mother trees. Students of the high school's horticultural department also cooperated, and local people worked together in varietieselection. After five years, the "Takada-Ume" variety was chosen as the best, and later named "Nanko" in reference to Minabe High School, which had been deeply involved in the selection process. Nanko was registered in 1965 by the Ministry of Agriculture and Forestry (now the Ministry of Agriculture, Forestry and Fisheries) (Photo 16). As stated previously, Nanko has excellent characteristics; subsequently, it played an important role in making this site Japan's premier ume-producing .

Photo 16. The Nanko variety.

Photo 17. The Gojio variety.

The variety "Gojiro," which was bred by the Tanabe-area "Nishimuro County Farmers Association" in the 1930s (Photo 17), is very beautiful in appearance and suitable for beverages. Because it can be harvested 10 to 14 days sooner than Nanko, it is an important cultivar that can spread out harvesting tasks.

Steady and diligent efforts at variety improvement conducted through a long history by generations of farmers built Japan's premier ume-producing district. Initiatives to preserve the diverse genetic resources that constitute the foundation for breeding such outstanding varieties are now continued mainly by the Japanese Apricot Laboratory, Wakayama Fruit Tree Experiment Station with the cooperation of local farmers.

Photo 18. Grass mowing on sloped land.

ii) Techniques for adapting to sloped land

Because the satoyama of this site has many slopes and the rudaceous soil is fragile, small-scale collapses of surface soil occur easily, and creating farmland such as terraced paddies and upland fields was difficult. For this reason, sod culture, which uses the slopes in their natural state, has been a means of preventing soil runoff.

Sod culture is a farming method which involves growing various herbs in orchards and mowing them when they grow to a certain height. With this method, moisture can be retained after rain even in sloped orchards because the topsoil becomes stable. This keeps the ground temperature from rising under direct sunlight, and the mowed grass is left as organic fertilizer for the ume trees. Grass is mowed around three times a year, in May (before the ume harvest), July (after the ume harvest), and September (Photo 18).

Ume for *umeboshi* are harvested after they become ripe and naturally fall. Farmers devised a labor-saving method, now employed by many, in which nets are placed under the trees to automatically gather the ume by taking advantage of the slopes (Photo 19). This net harvesting method also prevents soiling of the fruit and damage from the fall.

Photo 19. Net placed under ume trees.

iii) Pollination techniques taking advantage of mutualism with honeybees

As noted already, because many ume varieties of this site cannot self-pollinate, they require crossing with pollen from other varieties by means of honeybees or other insects. At this site, beekeepers have been keeping Japanese honeybees with traditional methods for at least 300 years. In recent years, the site has also come into the spotlight as a wintering ground for honeybees. As a result, a system of mutual help between ume and honeybees has been established.

Photo 20. Growing rape in an ume orchard.

Ume alone are insufficient as a nectar source. As a supplement, farmers grow rape in the orchards (Photo 20) and plant *Camellia sasanqua* among the ume trees. Honeybees are supplied with water not only by irrigation ponds and channels, but also by the canteens hung from ume tree branches to hold the branches of pollinizers. Furthermore, to maintain the mutualist relationship with honeybees and other pollinators, farmers do not apply pesticides during the ume flowering season.

At the same time, honeybees obtain nectar and pollen from the vast ume orchards in early spring when few other flowers bloom, which facilitates egg-laying by queen bees and the activities of worker bees. Honeybee colonies that have gathered nectar in ume orchards from February to March benefit, for example, by expanding earlier than colonies in other areas, enabling them to subsequently gather more nectar from the many flowers that bloom later in the vicinity.

iv) Pruning techniques to assure consistent production every year

To stabilize ume flowering, farmers have used knowledge and experience built over many years to establish pruning methods tailored to the characteristics of each variety. Although these techniques used to be passed on to leading local farmers long ago, currently they are being disseminated and kept alive by the agricultural cooperatives, prefectural guidance agencies, and farmer groups (Photo 21).

Photo 21. Outdoor class on pruning technique.

Generally, ume produce more fruit on short branches; the longer the branch, the worse the fruiting. Therefore, the general practice is to leave only the short branches and prune the mid-length and long branches. However, the Nanko variety fruits well on mid-length branches as well, so mainly the long branches alone are removed. Additionally, because the Koume variety fruits heavily and the ume become too small, farmers prune the mid-length and long branches, and also cut back the short branches by about one-third to limit the number of blossoms. Thus, pruning techniques adjusted according to the characteristics of these varieties for stable production of high-quality ume year after year are established on the basis of centuries of trial and error.

b) Locally developed *umeboshi* processing techniques

Ume are also produced in countries other than Japan, but they are used mainly in confections and medicines. In Japan, they have long been made into *umeboshi* (the word *umeboshi* appears in texts of the late Heian period [794–1185]). From about 400 years ago, *umeboshi* have been an everyday side dish in Japanese food, and have also been used in a

wide variety of dishes as a food ingredient and flavoring.

Umeboshi were already a local specialty in this area around the year 1700, which suggests that advanced *umeboshi* processing techniques had already been developed. At that time, ume were made into *umeboshi* and *umebishio* (a paste-like food made by cooking and flavoring the flesh of *umeboshi*), but farmers only grew ume, and processing was mainly the province of ume merchants.

It was about 1900 when farmers started making *umeboshi*. Many ume processors at that time were part-time farmers who made traditional *shiraboshiume* (salt-pickled ume) and *shisozukeumeboshi* (perilla-flavored pickled ume). Today, farmers make only *shiraboshiume* (primary processing), with secondary processing into "flavored *umeboshi*" being performed by ume processors who developed from part-time farmers to become specialized processors (Figure 5).

Shiraboshiume processing techniques have been passed down through the generations by farmers themselves. Currently, however, the Minabegawa Village Ume Processing Development Center founded in 1986 (now called the Minabe Town Ume 21 Research Center), the Umeboshi Producers Council organized by ume farmers, and other entities provide for uniform technique development and transmission to future generations.

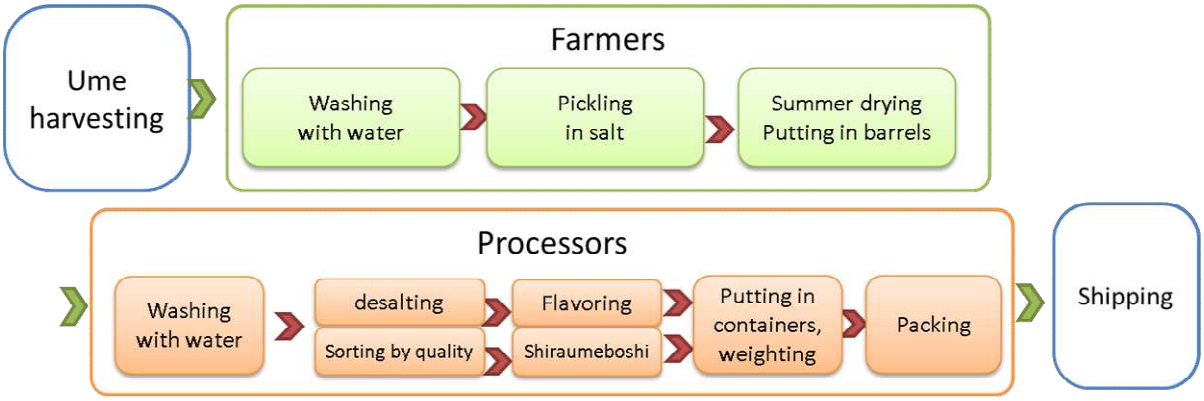


Figure 5. Flow diagram of current *umeboshi* processing.

c) Sustainable coppice forest management techniques

Coppice forests surround ume orchards so as to protect them.

Kishubinchotan charcoal is a hard charcoal made with *Quercus phillyraeoides* and other beech-family trees that grow wild and in large numbers in the coppice forests. Its quality is especially high among the charcoals used in various countries around the world. It is highly rated for charcoal-grilled foods, popular among cooking professionals, and far superior to other charcoals (Photo 22).

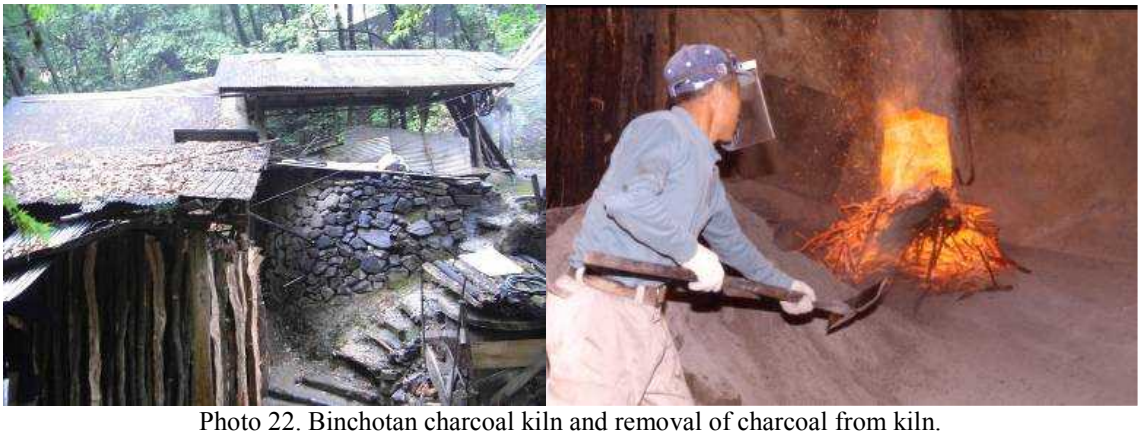


Photo 22. Binchotan charcoal kiln and removal of charcoal from kiln.

In a bid to maintain production of wood for Kishubinchotan charcoal, the practice of selective cutting was devised in the 1700s. The practice, unique to this area, involves cutting only trees of the right thickness for Kishubinchotan or trees that hinder the growth of *Quercus phillyraeoides*. If charcoal makers were to clearcut (meaning to cut all the trees) the slow-growing *Quercus phillyraeoides*, it could only be harvested once every 30 to 40 years. Selective cutting is an excellent technique because it allows cutting about every 10 years.

In recent years, damage caused by deer eating the sprouts that emerge after logging has become a problem in Japan's coppice forests. However, given that selective cutting leaves an appropriate number of trunks, another advantage of this management technique is that because it does not allow deer access to the extent that clearcutting does, the sprouts have strong regenerative capacity in total even if some of them are eaten.

Although coppice forest management techniques have been handed down through generations of charcoal makers, the number of local people who become charcoal makers today has decreased dramatically, and people from other places who newly take up the job are increasing. Therefore, charcoal maker associations and other bodies have taken up the responsibility of passing on the techniques (Photo 23).

Photo 23. Model forest for selective cutting and *Quercus phillyraeoides* shoots.

By sustainably managing coppice forests, its multifunctional role such as the conservation of watersheds and biodiversity are also maintained, thereby sustaining the diverse agricultural production of this entire area including ume-growing.

4. Cultures, value systems and social organizations (Agri-Culture)

The people of this area cherish and feel thankful for the blessings such as ume cultivation and charcoal making provided by the satoyama. In doing so, they create the distinctive culture of this area and keep it alive.

a) Ume-related festivals and events

The "Ume Memorial Service" is an occasion for thanking those of previous generations who made great contributions to the development of ume production, which has supported the livelihoods of this area. As part of the Ume Festival held every February 11, the "Ume no Sato Ume Blossom Viewing Association" performs a memorial service at the commemorative monument dedicated to Genzo Uchinaka (1865–1946, a pioneer of local ume production), which was erected in the Minabe Bairin Ume Orchard (located in Oshine, Minabe Town). During the ume flowering period, the Blossom

Photo 24. Ume Festival

Viewing Association also organizes unique events, such as an introduction to the history and culture of ume cultivation presented by picture-story shows, in which high school students and other local people participate (Photo 24).

Photo 25. Ume Offering Festival

The "Kishu Ume Association," which comprises municipalities, agricultural organizations, umeboshi processor associations, and other entities, designated June 6 as "Ume Day" (certified by the Japan Anniversary Association) based on a story that on June 6, 1545 at a regular festival held at Kamo Shrine in Kyoto, then Emperor Gonara made an offering of ume. On that day, offerings of this area's ume are made at Kamigamo Shrine and Shimogamo Shrine (Kyoto City), and at the local Suga-jinja Shrine (Minabe Town) and Kumano Hongu Taisha Grand Shrine (Tanabe City) in Shinto rites that give thanks for the harvest (Photo 25). Diverse events are also held at various locations, such as providing ume food in local school lunches.

Within the grounds of Tokei-jinja Shrine is the Togan-jinja Shrine, which was built in 1886 to thank Lord Naotsugu Ando (the feudal lord governing Kishu-Tanabe) for his achievements in promoting ume in the 1600s. Every year a festival is held here with the participation of people including those involved in ume-related businesses.

These examples show how not only local farmers and agricultural groups, but also members of the Tanabe City and Minabe Town public, participate in a variety of events held to express their gratitude to ume for sustaining their locality.

b) Traditional ume culinary culture

It was about 1300 years ago that people began making *umeboshi* in Japan. At first they were used as medicine by the upper class. People started eating *umeboshi* on a daily basis about 400 years ago, and since then *umeboshi* have been a familiar food to the Japanese (Photo 26).

Photo 26. *Umeboshi*.

People here not only eat *umeboshi* as they are. Traditional local dishes exploiting *umeboshi's* efficacy in eliminating odors and improving flavor have been handed down through the generations. Examples include "ume-stewed fish," in which *umeboshi* are broiled together with blue-fish, and "ume rice," in which *umeboshi* are cooked together with rice (Photo 27).

Photo 27. Local cuisine using umeboshi. Left: Ume-stewed fish. Right: Ume rice.

These traditional local dishes and newly conceived dishes are widely disseminated within and outside of this area by groups such as the Minabe Town Ume Cuisine Research Association, which comprises women from ume producing farm families, and are attracting interest.

As an element of Japanese cuisine, which is considered effective for maintaining and promoting health, ume have the potential to spread worldwide as a food that can further improve health.

c) Local bonds fostered by ume

In the course of events leading to this area's growth into Japan's premier ume-producing area as it is today, strong ties have developed among the local people, who have long cooperated in efforts aimed at using ume to develop their community. For example, the property ward forest was divided among approximately 200 farming families, who cleared the land and planted ume trees. When someone discovered a superior variety, they shared it with the whole village instead of keeping it to themselves. Even today, nearly all farmers cultivate ume, and when processing and other related industries are included, 70% of local working people perform ume-related jobs. Many ume-related events are held as well. In these and other ways, strong local ties have been nurtured via ume and passed down to the present.

The ume system also keeps young generations within the local area. There are many three- and four-generation households here, with all family members cooperating in ume harvesting, sun-drying, and other tasks. Family bonds are thus created through ume and passed on from one generation to the next.

5. Remarkable landscapes,land and water resources management features

a) Use of sloped land for coppice forests and ume orchards

Land use involving the arrangement of coppice forests and ume orchards, which are the constituent elements of this area's distinctive satoyama landscape, is the result of ume having been cultivated by making use of the natural slopes of the mountains without alteration (Photo 28). This is because, as explained previously, the satoyama here is characterized by rudaceous soil, brittle geology, and poor water retention. Although some ume cultivation currently occurs on flat land for stabilizing farming operations, most ume cultivation makes use of satoyama slopes.

By leaving coppice forests above and around the ume orchards, farmers made them exert functions such as watershed conservation and slope collapse prevention, and in ume orchards they practice sod culture to protect the soil and improve water retention. By these means they achieved a type of land use, rare even in Japan, which uses ordinarily unusable land as orchards.

Photo 28. An example of coppice forest and ume orchard arrangement.

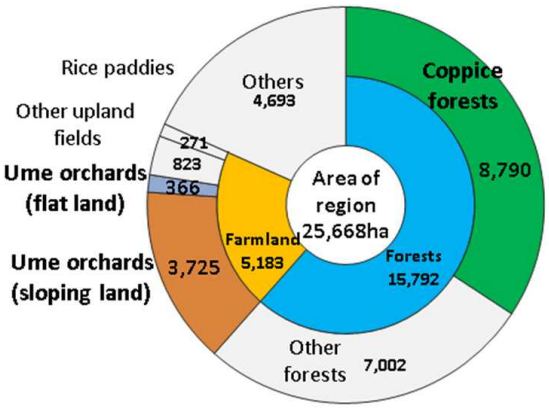


Figure 6. Land area according to land use in the Minabe-Tanabe area.

Prepared using sources including Forest Resources Status Tables, Fact Finding Survey on Land Use Status, and statistics from the Ministry of Agriculture, Forestry and Fisheries.

The proportions of ume orchards and coppice forests vary according to topography, but in total ume orchards cover an area of 4090 ha and coppice forests an area of 8790 ha (Figure 6).

b)Seasonal changes in ume orchard scenery

Ume orchard scenery changes with the seasons (Photo 29) and is a valuable tourism resource. In particular, when ume trees are flowering, farmers open the orchards to allow the public to walk freely inside, and welcome ume-viewing tourists who are eagerly awaiting spring. Every year, about 50,000 tourists from all over Japan visit three ume orchards in particular—Minabe Bairin Ume Orchard, Iwashiro Daibairin Ume Orchard, and Kishuishigamitanabe Bairin Ume Orchard—where they enjoy the fragrance of ume blossoms in early spring.

Photo 29. Ume orchard scenery.

c) Coppice forest management different from that of other satoyama

Even now, the satoyama here is sustainably used as coppice forests for the charcoal-making industry. They are maintained so that the interior is well-lit and sunlight reaches the ground as well, which enables many kinds of plants to grow. What is more, selective cutting and other outstanding forest maintenance techniques, which secure a stable supply of wood for Kishubinchotan charcoal, are being kept alive by charcoal-makers' groups and other organizations.

d) Organized maintenance of irrigation ponds and irrigation channels

From about 1800, many irrigation ponds have been built in the valleys surrounded by the deep mountains and coppice forests. These ponds and irrigation channels leading to rice paddies are managed by irrigation associations organized by the local farmers in each river system, and always maintained in good condition by channel cleaning, weed mowing, and other tasks performed together. Such water resource management not only serves as a countermeasure for droughts, but also mitigates the impact of heavy rain in this area, which is susceptible to typhoons and other weather events.

II. Other social and cultural characteristics pertinent to the management of the agricultural system

a) Agricultural festivals

The site holds a variety of agricultural festivals throughout the year, from "Yamazome" (a custom for starting the year's work, by making offerings to mountain spirits) on January 4 to "Inoko" (a custom in which people make and give rice cakes on the day when the rice paddy spirit departs), when people give thanks for the autumn harvest.

Suga-jinja Shrine, said to have been built around the year 1000, brings people together in its role as the center of local agricultural Shinto rites. In particular, the traditional rite of "Fire Divination," which divines the rice crop condition according to how a torch burns, has continued for at least 300 years. It preserves a story about how people used an oracle to choose which rice variety to plant.

Mushiokuri is a rite performed to expel insects that are damaging to rice cultivation, and almost all districts of Minabe Town still conduct their own distinctive *mushiokuri*. The *mushiokuri* of Gokuraku-ji Temple (located in Nishihonjo, Minabe Town), which is also known as *sanyari*, has a long history and is a town-designated cultural asset. Every July 7, starting at about 7:00 p.m., children gather and walk throughout the district holding torches and chanting *sanyari sanyari sanemorisanno otomurai* at the lead of a temple representative.

In the Autumn Festival occurring every October at Takagitenpo-jinja Shrine (Minabe Town), a portable shrine is carried around the shrine counterclockwise three times in an imposing spectacle conducted amid a solemn ambience (Photo 30).

Kiyokawatenpo-jinja Shrine (Minabe Town), which has a long history including a ridge beam construction plaque dating to 1517, has a "Kiyokawa Festival" every November 1 featuring the dedication of a performance by the local Lion Dance Preservation Society consisting of four lion dances called "Dochu," "Heinomai," "Ranjishi," and "Tsuruginomai," which have been preserved with care in their traditional form (Photo 31).

Photo 30. Takagitenpo-jinja Shrine Autumn Festival

"Yamamatsuri" (mountain rites) are held on November 7, in which people who make a living by working in the mountains climb the mountains of their respective villages, make offerings of saury fish and saké to the mountain spirits, and offer them prayers to ask that their work in the mountains will proceed without incident.

These agriculture-related festivals, which are conducted mainly at shrines, used to be a common sight throughout Japan, but in this area they remain living festivals instead of hollow rituals to this day. This is because there are many people here who are engaged in agriculture and live in great awe of nature.

Photo 31. Kiyokawatenpo-jinja Shrine Festival

b) Ume-related culture

Ume dolls are folkcraft goods using ume pits. It is said that they probably owe their beginning to the upper-grade children of Minabe Elementary School, who in the 1930s made "magic mallets" out of ume pits and sold them during the ume blossom-viewing season to help cover the expense of their school field trip. Since the 1970s, people including groups of women from farming families of Minabe Town have been making ume dolls, which they display and sell every year at the February 11 Ume Festival and other events (Photo 32).

Photo 32. Ume dolls.
Left: Made by Teruko Kirimoto; right: made by Katsu Iwamoto.

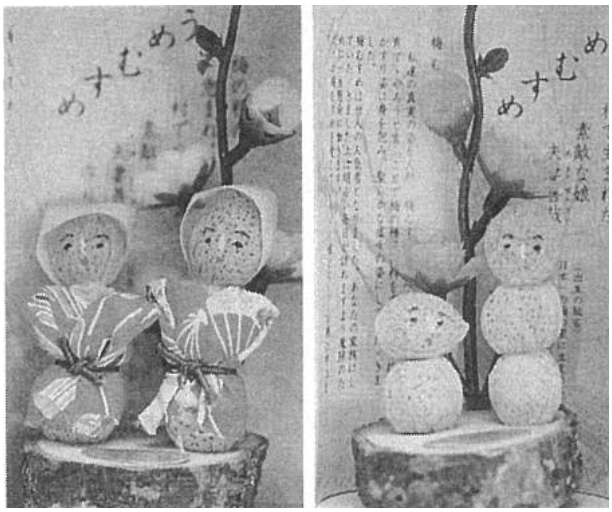


Photo 32. Ume dolls.
Left: Made by Teruko Kirimoto;
right: made by Katsu Iwamoto.

III. Historical relevance

a) History of ume

It is said that ume came to Japan from China about 1500 years ago as an herbal medicine called *wumei*. Later during the Nara Period (710–794), people devised a "salt pickling method" capable of long-term preservation, from which modern-day *umeboshi* are derived.

The *Ishinpō* (Prescriptions from the Heart of Medicine) is Japan's oldest medical text, and was compiled in 984 during the Heian Period. Its "Food and Nutrition" volume includes information on the medical efficacy of ume.

Books and other texts compiled during the Kamakura period and the Muromachi period (1336–1573) also contain many references to *umeboshi*. It is believed that from that time through the Edo Period (1603–1868), *umeboshi* became a regular part of the common people's everyday diet.

At the same time, the Japanese have been very fond of ume not only as food, but also as an object of appreciation and as art.

In the Nara Period, ume blossoms were the object of flower-viewing. Unlike cherry blossoms, ume blossoms have a calm ambience and unpretentious beauty, and they appear in 118 poems in Japan's oldest poetry collection, the *Manyoshu*. The ume is also used frequently in the traditional Japanese cultural arts of ikebana and bonsai, and has been a preferred subject of artists of Japanese-style painting.

b) History of the ume system

The geological conditions of this area make most of the satoyama unsuitable for farming and forestry, and flat land has low rice yields due to nutrient-poor soil. For these reasons, many villagers lived in poverty until ume cultivation began.

Around 1620, Naotsugu Ando, who governed Kishu-Tanabe at that time, focused his attention on a "wild ume" that had already been present in the village, encouraged ume cultivation on mountain slopes and poor land that could not produce rice, and endeavored to alleviate peasant taxes and to foster agricultural crops. This marked the beginning of ume cultivation in this area, and from this period, ume became an important agricultural product that supported local livelihoods.

The good soil drainage and climatic conditions were suitable for ume, and the locality

produced high-quality *umeboshi*. When it sent them to Edo, they were highly acclaimed and cultivation gradually expanded. The *Kii no Kuni Meisho Zue*, published in 1811, shows the expanse of this area's ume orchards (Figure 7).

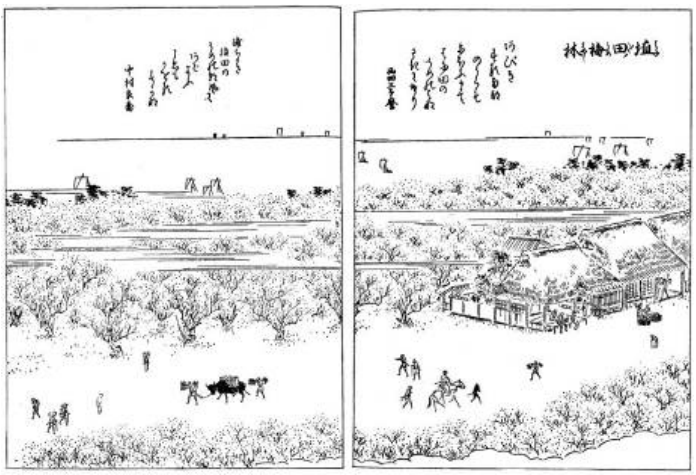


Figure 7. Haneta Bairin Ume Orchard, from *Kii no Kuni Meisho Zue* (Illustrated Collection of Famous Places of the Kii Province).

From that time, whenever people found ume of even slightly better quality they used them as mother trees, selected individuals with excellent traits, and kept disseminating variety groups that were refined through many generations.

The 1900s brought an increase in part-time farmers who locally produced and processed ume. Some of them gradually became specialized processors, and this led to the development of ume-related industries. This occurred in parallel while other farmers who, in order to stabilize their operations, began to perform primary processing (*shiraboshiume*) themselves and then supply them to processors. In this way, the current system configuration was established.

Charcoal production here (hard charcoal making) is said to have begun about 1200 years ago when the monk Kukai (posthumously Kobo-Daishi) brought back the technique of charcoal making from China and taught it at Mount Koya and throughout Wakayama Prefecture. Kishu charcoal, which is long-lasting and burns hot, was highly valued from that time and called Yuya charcoal or Tanabe charcoal. In the 1700s, a Tanabe City man named Chozaemon Bicchuya took some charcoal to Edo, where it was called "Kishubinchotan charcoal" in light of its excellent quality, and it came to be highly valued.

When charcoal making flourished under the encouragement of the Kishu feudal domain in those days, a shortage of wood developed. To make up for this, selective cutting was devised as a means to secure a sustainable supply, and the technique has been passed down through generations of charcoal-makers. As a result, to the coppice forests are still maintained to this day and their functions of satoyama watershed conservation and slope collapse prevention are preserved. The activity of Japanese honeybees and other organisms inhabiting the area supported ume cultivation.

IV. Contemporary relevance

a) Preservation and use of ume genetic resources

Environmental deterioration and other factors caused by climate change and development are apparently diminishing diverse genetic resources around the world and jeopardizing their existence. In agriculture as well, it is deemed important to gather and preserve useful genetic resources, and to facilitate their sustainable use.

During the long history of ume production at this site extending approximately 400-years, local farmers have taken the lead in repeatedly performing natural crossing and seedling propagation. In the process, they created outstanding ume varieties suited to eating such as the Nanko brand, which is representative of Japan. In this way, the farmers here have nurtured diverse genetic resources.

Currently at least 23 ume varieties are grown in this area, and the Japanese Apricot Laboratory, Wakayama Fruit Tree Experiment Station preserves 121 varieties in four groups, including varieties created in other areas. Additionally, new varieties are being developed on

the basis of these varieties. These include the new variety NK-14, which can self-pollinate and is now being cultivated in the area.

b) Contribution to global warming abatement

Global warming abatement is a worldwide challenge, and attention is being focused on broadening the use of sustainable and renewable energy sources that will replace fossil fuels. One source is biomass in the form of firewood and charcoal.

In a bid to sustainably use coppice forests, charcoal makers' organizations and other groups are endeavoring to teach the selective cutting technique to people who have recently become charcoal makers (Photo 33).

Photo 33. Teaching selective cutting technique.

Because only the *Quercus phillyraeoides* trees used for making Kishubinchotan charcoal have been harvested extensively, but leaving a surplus of other tree species. Hence in recent years there has been an effort to use other tree species such as Castanopsis trees as fuel for wood-fired boilers that heat local farmers' greenhouses for growing cherry tomatoes and other agricultural products, in order to promote the balance of tree species in the coppice forests.

c) Response to climate change and natural disasters

Recent years have seen frequent occurrences around the world of extreme weather such as torrential rainfall and drought, which cause grave damage to agriculture and forestry. The ume system is also resistant to torrential rain and drought because, in addition to coppice forest functions such as watershed conservation, practices including sod culture, which protect the ground surface within the ume orchards, are environmentally adapted management methods.

It should be mentioned that the government sees highly nutritious *umeboshi* as a side dish to be included in emergency food stocks for household use during natural disasters. Both the national government and municipalities are promoting the inclusion of *umeboshi* in emergency food stocks.

d) Lifestyle disease prevention and initiatives for health-conscious consumers

The increase of obesity and lifestyle diseases in developed countries (OECD countries) is a serious problem. It is well known that ume have beneficial effects including recovery from fatigue, regulation of intestinal functions, and bactericidal effects, and there are reports that ume also suppress these lifestyle ailments. Efforts involving primarily local ume processors and research institutions are now underway to medically illuminate the effects of ume so that they can improve health, for example, by preventing lifestyle diseases. Starting in FY2001, eight institutions including the Minabe Town Ume 21 Research Center, Wakayama Medical University, Kinki University, and the

Photo 34. Presentation of research on functionality.

National Institute of Technology, Wakayama College conducted joint research. They revealed that ume effectively suppress the motility of *Helicobacter pylori*, which causes peptic ulcers, and successfully determined the structure of the substance that produced this effect (patent no. 4081678) (Photo 34). They also found that ume contain ingredients that suppress blood sugar elevation and inhibit the actions of an enzyme (α-glucosidase) leading to obesity and other conditions (patent no. 4403457).

Photo 35. Epidemiological study with citizen participation.

Wakayama Medical University and Minabe Town performed a study on the effect of ume vinegar polyphenols in lowering blood pressure, in which ume producers also participated (Photo 35). They are working to make the results widely known via the internet and other media.

e) Contributions to improving food safety and quality

The ume vinegar resulting from the *umeboshi*-making process has long been used as medicine (gastrointestinal drug, gargle, etc.) and for pickling. It has also been given to chickens physically weakened by the summer heat to help them recover their strength.

The efficacy of ume vinegar in chickens was scientifically demonstrated in a joint study conducted by local ume processors and the Poultry Farming Laboratory, Livestock Experiment Station, Wakayama Prefectural Government. In response to these results, ume processors, poultry and egg producers, and other parties formed a council and established brands called “Kishu Ume Chicken” and “Kishu Ume Eggs,” for chicken meat and eggs produced by taking advantage of ume vinegar’s effects (Figure 8). Kishu Ume Chicken won the top prize in the 2008 Meat Industry Exhibition’s Local Chicken and Brand Chicken Taste Contest.

Figure 8. Kishu Ume Chicken and Kishu Ume Eggs.

Throughout Wakayama Prefecture safer and higher-quality foods are being developed by mixing ume vinegar into the feed for livestock such as pigs and that for farmed fish such as red snapper.

f) Response to worldwide disappearance of honeybees

In a 2011 report on honeybees, the United Nations Environment Programme (UNEP) states a sudden outbreak of the Colony Collapse Disorder (CCD) has been observed whereby 10–30% of Western honeybees have died in Europe, 30% in the United States, and 85% in the Middle East, and warns that an international effort is needed to protect honeybees, which are indispensable for pollinating fruits and vegetables. It is believed there are multiple causes of death including pesticides, air pollution, environmental damage, and fewer nectar sources, and it is pointed out that these factors are behind the decline in European beekeepers. The United Nations Food and Agriculture Organization (FAO) claims that 71 of the approximately 100 principal crops that provide 90% of the world’s food require pollination by honeybees. In Japan, more than 100,000 honeybee colonies annually are introduced into greenhouses and

orchards for pollination, and more of them are needed each year. Securing a stable supply of honeybees is an urgent and crucial task for the world's food supply.

Agriculture at this site features a well-maintained mutualistic relationship between ume cultivation and honeybees, and farmers have a long history of treating honeybees as important partners. In February when ume trees flower, temperatures are still low and honeybees have a small activity range, but the vast orchards of flowering ume trees enable the bees to efficiently gather nectar and pollen. The supply of fresh nectar and pollen at this time stimulates egg-laying in queens and activity in worker bees, which expands bee colonies early in the year and promotes better nectar-gathering from flowers that bloom later. This site is currently one of Japan's major producing districts for pollinating honeybees (Table 4). Hence, the honeybee-friendly practices observed here in this site could provide best practices to other countries in their management of honeybees and provide insights on how further spread of CCD can be prevented.

Table 4. Five prefectures keeping the largest number of honeybee colonies.

Number	Region	No. of colonies	Percentage
		(Thousands)	%
	Nation	210	100.0
1	Nagano	12.4	5.9
2	Wakayama	11.4	5.4
3	Kumamoto	10.6	5.0
4	Kagoshima	10.3	4.9
5	Okinawa	9.9	4.7

Note: Figures for 2014 according to the Livestock Production and Feed Division, the Ministry of Agriculture, Forestry and Fisheries.

V. Threats and challenges

a) Crises and challenges

The environment of the satoyama at this site has been sustainably conserved through the human activities of ume production and charcoal making.

However, the socioeconomic circumstances underlying ume production and charcoal making are changing rapidly, and maintenance of the system involves a number of challenges.

i) Fewer farming families and aging society

The population continues to decline and age in the Minabe-Tanabe area, posing a serious threat to the continuation of ume production and charcoal making. The population fell from 85,094 in 2000 to 79,563 in 2010, and during that same period, farming families decreased from 3,646 to 3,313 (Figure 9). In 2010, 43%

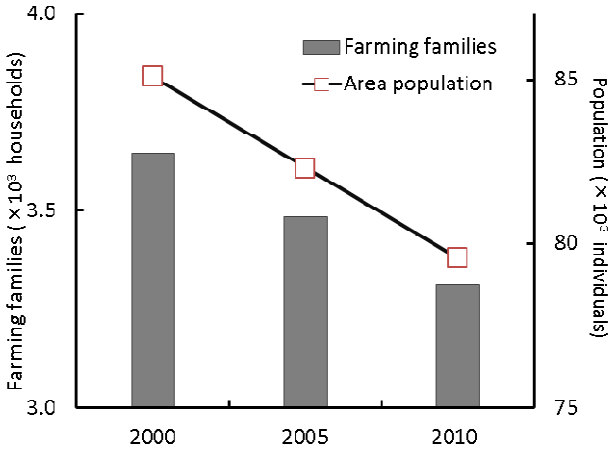


Figure 9. Population and number of farming families in the Minabe-Tanabe area
(data from the World Census of Agriculture and Forestry).

of people in the agricultural workforce were 65 or older. In these and other ways, the population engaged in farming is aging.

It is therefore necessary to find successors from not only this area, but also to secure new farmers from other places because local successors alone are insufficient. To that end, local people are continually making efforts to tell others about the attractiveness of local farming, holding events in which young people from cities participate as volunteers in farming tasks; and offering hands-on opportunities to experience farming. It will be necessary to carry out such initiatives with ever-increasing effort in the coming years as well.

ii) Declining ume consumption

Conditions surrounding ume production do not allow for optimism. Challenges include lower prices owing to imports of inexpensive Chinese *umeboshi* and competition with other domestic producing districts, as well as declining *umeboshi* consumption due to an increasingly Western-style diet (Figure 10).

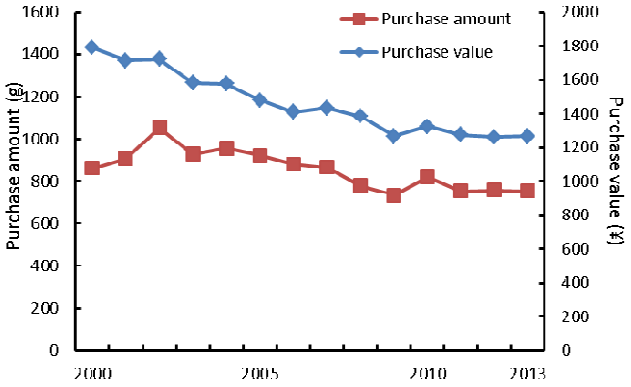


Figure 10. Amount of *umeboshi* purchased, and purchase value per Japanese household
(data are from the Ministry of Internal Affairs and Communications Family Income and Expenditure Survey).

Increasing ume consumption will require increased research on the medical and health-promoting effects of ume, and publicity to make them widely known. At the same time, it will require increasing consumers throughout the world, for example, by using new processing methods adapted to the culinary cultures of other countries. It will also be necessary to inform people that ume are good as emergency food stocks during disasters.

iii) Coppice forest management techniques being lost

In the postwar years, Japan has used mainly fossil fuels and demand for charcoal has plunged. Although charcoal is now getting a second look as fuel for grilled foods, charcoal makers are aging. In coppice forest management as well, selective cutting and other techniques are being inadequately passed on to the next generation owing to the increase in people from cities and other inexperienced successors, which in turn is leading to inappropriate cutting that hampers the cyclical use of coppice forests. For these and other reasons, the community is losing the system by which previous generations produced high-quality charcoal while maintaining forests in sound condition.

It is necessary to inform people widely about the advantages of Kishubinchotan charcoal, and the effectiveness of charcoal fuel in conserving the global environment. Simultaneously, it is also necessary to conserve the satoyama and find successors for charcoal makers, by facilitating understanding of satoyama through interactions with urban residents. In addition, charcoal makers' groups and others will need to play a central role in teaching successors the sophisticated techniques for making Kishubinchotan charcoal, and sustainable coppice forest management techniques including selective cutting.

iv) Increase in ume vinegar and leftover ume flavoring liquid from processing

The ume vinegar left after processing ume has long been put to good use locally to pickle foods and as a gastrointestinal drug and gargle. However, in recent years more vinegar is being produced owing to increased ume production and processing. Additionally, the

increased flavoring for flavored *umeboshi* tailored to contemporary consumer tastes results in more leftover ume flavoring liquid (post-use *umeboshi* flavoring liquid), whose disposal has become a problem.

To work toward zero emissions in the ume industry, ume farmers and ume processors, as well as people in a wide array of businesses, must come up with ideas, conduct research on new ways to use ume vinegar and leftover ume flavoring liquid, and alleviate their environmental burden as much as possible.

VI. Practical considerations

a) Ongoing efforts to promote GIAHS

i) Promoting ume production

In a bid to improve production techniques, public research institutions (the Japanese Apricot Laboratory, Wakayama Fruit Tree Experiment Station and Minabe Town Ume 21 Research Center) are breeding new varieties, developing techniques, and hosting trainees who want to take over farming operations (Photo 36).

Photo 36. Outdoor class on ume cultivation.

Nanko is currently the main variety, but all the diverse genetic resources (varieties) grown thus far are preserved and being used for new variety development by these research institutions.

As stated previously, universities and other research institutions are unlocking the secrets of the medically functional constituents in ume, and have obtained many findings including the effects of ume extract on diabetes and hypertension.

Producers, agricultural cooperatives, ume processors, and local governments are cooperating to increase ume consumption by availing themselves of every opportunity such as product fairs in an effort to advertise products.

Other enthusiastically pursued initiatives include using the "Certified Local Foods Program," which is run mainly by municipalities; promoting brand development catalyzed by the registration of "Kishu Minabe Nanko Ume" as a regional collective trademark by a local Japan Agricultural Cooperatives (JA) group; and the development and dissemination of new kinds of ume cooking by the local Minabe Town Ume Cuisine Research Association.

Efforts to use the by-products generated by ume processing in order to achieve "zero emissions in the ume industry" include the development of feed using ume vinegar for livestock and farmed fish, and research on ways to use leftover ume flavoring liquid as a soil amendment. These initiatives are conducted mainly by local governments, agricultural cooperatives, and ume processors. Private-sector companies are carbonizing ume pits and developing functional products that take advantage of their deodorizing effects and other characteristics.

ii) Kishubinchotan charcoal production and coppice forest conservation

To teach selective cutting technique to new producers, local charcoal maker groups and others are playing the leading role in establishing training forests (model forests for selective cutting) and providing guidance through practice. They are also offering hands-on learning for elementary school pupils to heighten interest in traditional techniques among children, who will be the next generation of producers.

In addition, area residents have taken the lead in conducting activities that revive coppice forests by organizing the "Minabe Making of Centennial Forest Association" and planting mainly broadleaf trees such as *Quercus phillyraeoides* and *Quercus glauca* in mountain areas that were denuded and left abandoned by failed development projects in the past (Photo 37).

Photo 37. Planting trees.

iii) Exchanges between cities and rural communities

The understanding and support of urban dwellers is indispensable for agriculture and forestry development, and it is vital that urban dwellers take up these occupations. As shown below, various local entities are promoting exchanges with urban dwellers through a variety of activities.

○ **Information-providing facilities**

The "UME Promotion Museum" established and operated by Minabe Town presents the history, culture, techniques, and other aspects of ume cultivation in an easily understood manner using a large variety of exhibits. It also serves as a place for urban dwellers and local residents to meet, and receives about 35,000 visitors a year (Photo 38).

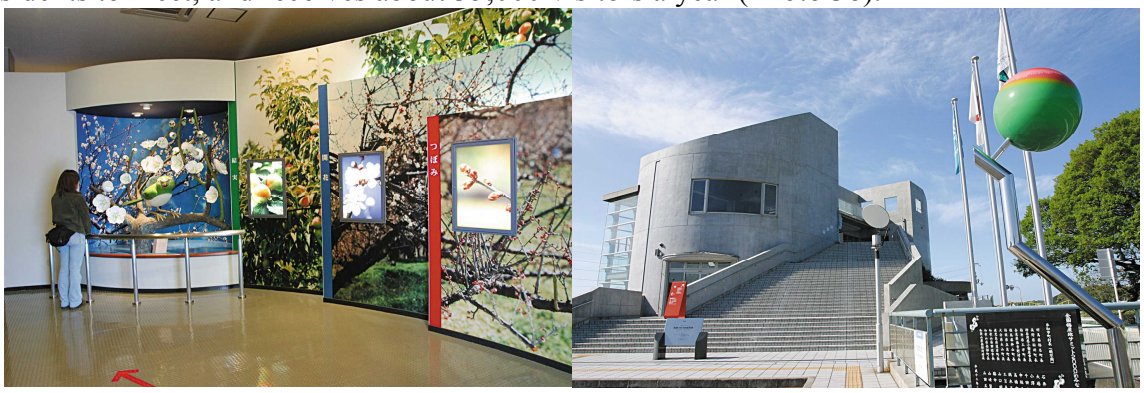


Photo 38. Minabe Town UME Promotion Museum.

Facilities that provide information about Kishubinchotan charcoal are Minabe Town's "Charcoal Museum" and Tanabe City's "Kishu Binchotan Memorial Park." They provide urban dwellers and others with information on the history, technique, and other aspects of Kishubinchotan charcoal. They welcome about 20,000 visitors yearly. Because these facilities have charcoal kilns for training purposes, they also serve as facilities where new charcoal makers from cities and other places learn techniques.

○ **Urban-rural exchange facility (Akizuno Garten)**

"Akizuno Garten" (Photo 39), located in Tanabe City in Kamiakizu,Tanabe City , is an urban-rural exchange facility established and operated by local residents. The retro-style building is popular, having made use of an old schoolhouse for elementary school. It includes a restaurant offering a slow-food smorgasbord provided by local farmers, lodgings, a kitchen where people can try their hand at making sweets, rooms in the old wooden schoolhouse for training and socializing, and more. Visitors can also get various kinds of first-hand farming experience including cultivation (Photo 40), making the facility a center that provides important agricultural information for this area.

Photo 39. Akizuno Garten.

Photo 40. Hands-on farming experience.

There are also 14 country guesthouses run by farming families in this area. They provide valuable opportunities for urban dwellers to tangibly experience life in an ume-producing district, for example, from the joy of raising and harvesting crops and interacting with local people through staying in a farmhouse and getting hands-on experience with ume harvesting and other tasks. By providing information about these guesthouses and making arrangements for the guests, Akizuno Garten also serves as the focal point for urban-rural exchange for the entire area.

○ **Diverse entities provide information and promote exchanges**

To promote ume farming to urban dwellers and others, agricultural cooperatives are engaged in endeavors that include providing ume-harvesting experience for urban dwellers and college students, and having cooperative employees and members (farmers) visit consumer areas to explain processing methods for *umeboshi* and ume juice.

Various local entities are engaged in providing information and promoting exchanges, from pruning classes hosted by ume farmers to *umeboshi*-making workshops taught by *umeboshi* makers. These initiatives are not carried out by individual entities acting alone; instead, with municipalities playing the central role, the institutions involved and other entities collaborate in jointly providing information and soliciting visitors.

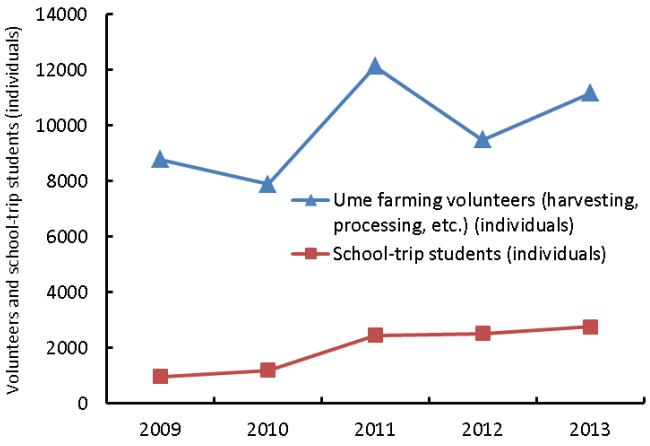


Figure 11. Numbers of ume farming volunteers and school-trip students across time.

Furthermore, in recent years Tanabe City and Minabe Town have taken the lead in efforts to attract elementary, junior high, and high school students here on their school trips from other prefectures. The nearly 3000 students who visit each year gain a better understanding of this area's agriculture by directly experiencing ume harvesting, charcoal making, and other tasks (Figure 11).

○ **Farmers' markets**

Locally there are two farmers' markets managed directly by JA and one operated by local farmers. They sell a wide variety of farm produce including ume products, citrus fruits, vegetables, and flowers. All three are busy with a total of approximately 500,000 customers a year from the locality and elsewhere (Photo 41).

Photo 41. A crowded and busy farmers' market.

b) Potentials and opportunities for sustainability and management of GIAHS

Many local research organizations and producers' organizations are acting independently to promote ume production and charcoal making.

If this site receives GIAHS certification, such activities would be boosted and the securing of farming successors facilitated. This, in turn, would be highly effective in passing on the generations-long ume system of this area to the next generation.

Additionally, this would occasion a renewed awareness among local residents of satoyama values and ume cultivation history, and spur them to revive the locality with a sense of pride and make it more attractive. Certification also holds promise of its effectiveness in encouraging people from other places to farm here.

c) Expected impacts of GIAHS on society and ecology

Conceivably there are three desirable impacts that GIAHS certification would have on society and ecology.

The first impact is "the maintenance and management of traditional cultural resources and contributing to health maintenance of the world's people." It may be expected that by fostering a groundswell to conserve and manage the ume system among the local populace, arrangements for the future continuity of the system would be put in place, and that these arrangements would not only lead to the advancement of agriculture and forestry, but also make a major contribution to ecosystem maintenance.

There is also the promise that ume, which contain many functional constituents good for promoting health, would contribute to the health maintenance of people worldwide if they are publicized and supplied to the world as a safe and reassuring food.

The second is "the promotion of urban-rural exchange." There is not only promise of a boost in green tourism and increased farm guesthouse visitors such as ume-viewing tourists and people seeking hands-on farming experience, but also expectations that through such exchanges, some urban dwellers will move here and take up farming and forestry.

The third impact is "the strengthening of product brand power." GIAHS certification would exponentially increase the recognition of ume not only in Japan, but also internationally. Therefore, if processed ume products are developed to suit the culinary cultures of different regions, it is highly possible that ume will be well received in other countries as well. And because ume have a deep association with Japanese food, this would create an avenue to expand their consumption abroad along with the popularization of Japanese cuisine.

d) Motivation of the local community, the local/national authorities and other relevant stakeholders

i) Local community

The site has organizations for the promotion of ume production, such as the "Minabe-go Ume Action Committee" and the "The Kishu Tanabe Ume Promotion Committee," which comprise municipalities, producers, agricultural cooperatives, and other related bodies. These organizations implement their own ume promotion measures independently while coordinating with one another.

The "Minabe-Tanabe Regional Association for GIAHS Promotion," which is organized by these groups' affiliates, experts, relevant municipalities, and other entities, serves as the parent organization for carrying out initiatives aimed at certification. It also makes every effort to maintain the ume system of this area.

By means of such activities, the local community will promote sustainable GIAHS use and provide for vitalization of the locality, including agriculture and forestry, while conserving the traditional agriculture, culture, and landscape.

ii) Prefecture

The prefecture has developed a Fruit Farming Promotion Action Plan on the basis of the Wakayama Prefecture Long-Term Integrated Plan and the Wakayama Prefecture Fruit Farming Promotion Plan, and from FY2011 through FY2017 is implementing promotion measures that include the creation of a distinctive producing district by introducing a diverse range of ume varieties, and a processed food development project in partnership with the food industry.

Through the "Rural Exchange Project for Children," which encourages elementary school children to lodge in fishing and farming villages to experience life there, and the activities of the "Green Tourism Promotion Council," the prefecture is actively engaged in urban-rural exchanges.

iii) Nation

Under the "Basic Plan on Food, Agriculture and Rural Areas" (2010), the national government is working on the creation of "industries" that make use of local resources. Based on the "National Biodiversity Strategy of Japan 2012–2020" (approved by the Cabinet on September 28, 2012), the government will also pursue plans from the perspective of agricultural and environmental measures.

VII. Outline of dynamic conservation plan (action plan) after GIAHS certification

The Minabe-Tanabe ume system is built on innovative land use suited to local topography and geology, involving mainly the cultivation of ume on sloped land, and including coppice forests arranged above and around ume orchards as well as and rice paddies in the lowland satoyama. This system supports the livelihoods of the local populace, and has maintained the ecosystem with its characteristic biodiversity and the remarkable landscape.

The "Minabe-Tanabe Regional Association for GIAHS Promotion," which comprises the relevant municipalities, local relevant organizations, and other parties, will carry out the following activities to pass on the outstanding arrangement of this ume system to the next generation and to use and conserve the GIAHS-certified site.

a) Ume system conservation

i) Promoting ume production

In recent years the ume industry has faced stiffening headwinds because of factors including depressed prices and stagnant *umeboshi* consumption, and the number of farming successors is trending downward. For these reasons, farmers' organizations, agricultural cooperatives, training and guidance agencies, administrative authorities, and others will work together on problem-solving, maintaining tree vigor such as by replanting with superior varieties and amending the soil, and introducing new cultivation techniques as well as new varieties to improve productivity. Additionally, through training sessions such as technique workshops for new farmers and others, farming successors will be nurtured to take over and support the production district.

Additionally, the locality will link up with universities to set up and expand an arrangement by which farmers will offer lodging and meals to students in exchange for help with farm tasks during the busy season. In doing so, the locality will aim to obtain farm labor, and at the same time expedite urban-rural exchanges to secure future farmers.

Furthermore, through collaborations with universities and other research institutions, the locality will continue to determine the functional constituents of ume and to broaden the use of varieties that contain many highly functional constituents. Partnering with the food processing industry, the locality will plan to grow the market by conducting research and development on processed products that take advantage of the characteristics of those varieties.

To achieve "zero emissions in the ume industry," by which wastes are cut to a minimum, ume farmers and processors, as well as a variety of other business sectors, municipalities, research institutions including universities, and other entities, will cooperate and share ideas to increase the reuse of ume vinegar and leftover flavoring liquid, and to carry out studies on new ways to use them.

ii) Promoting the charcoal industry

Kishubinchotan charcoal faces many challenges including the aging of producers, inadequate coppice forest management, and slumping income in the charcoal industry, creating several reasons for concern about transmitting sophisticated charcoal-making techniques to succeeding generations and maintaining the charcoal industry. Going forward, charcoal makers' organizations will play the main role in actively fostering successors by accepting and providing technical training to people who left the area and returned, and to new people from other places, as well as by supporting activities that allow students from elementary school through high school to experience charcoal making. At the same time, they will attempt to secure a sustainable supply of wood for charcoal and conserve the multifaceted functions of coppice forests by teaching young people techniques including selective cutting, a traditional coppice forest management technique.

Another endeavor will involve taking advantage of the functions of Kishubinchotan charcoal to develop new products for uses other than as fuel, and to expand sales channels.

b) Conserving biodiversity

In recent years, some areas have been experiencing increasing difficulty in maintaining biodiversity owing to the growing amount of farmland being abandoned because of wildlife damage, aging of the farming population, and other factors. Therefore, farmers' organizations, municipalities, agricultural cooperatives, and local residents will work together to keep farmland from being abandoned and solve the problem.

Charcoal makers' organizations and municipalities will cooperate to maintain the biodiversity and diverse functions of coppice forests by teaching selective cutting and other

traditional coppice forest management methods to newcomers.

Educational institutions (e.g., schools), museums, and other facilities will take the lead in conducting a broad range of environmental education activities, using satoyama learning programs and biological studies, for not only local residents but also ume consumers, urban dwellers, and others.

c) Passing on traditional culture and industries linked to farming

i) Passing on traditional techniques

The ume production of this area developed in partnership with the ume processing industry, but the primary processing technique of pickling harvested ume in salt and then sun-drying them to make *shiraboshiume* has become the regular practice among producing farmers. The Umeboshi Producers Council organized by ume farmers, the Minabe Town Ume 21 Research Center, and others will form the nucleus of efforts to maintain and teach *shiraboshiume* primary processing techniques. To pass on techniques for coppice forest management and charcoal making, charcoal makers' organizations will use training facilities, model forests for selective cutting, and other means. Additionally, they will facilitate understanding of multifaceted coppice forest functions and the importance of charcoal resources such as *Quercus phillyraeoides* through hands-on classes and other means in elementary schools.

ii) Conserving local landscapes

The primary landscape here consists of ume orchards and coppice forests on slopes, and conserving that landscape requires the functioning of the ume system. Efforts will be made to maintain this system and pass it on to future successors. Additionally, tourist ume orchards and practical seminars in agriculture and forestry will be used to seek the understanding and cooperation of urban dwellers toward landscape conservation activities.

iii) Nurturing cultural stewards

Producers will conduct local studies and hand-on learning to teach ume production history, ume harvesting, *umeboshi* making, and other topics to elementary school students. At autumn festivals and other events, local neighborhood associations and other organizations will play the leading role in encouraging the participation of all, from children to adults, in an effort to have people understand the significance of traditional events that have been observed throughout the area, including drums, portable shrines, and lion dances, and to transmit these to the next generation.

To preserve ume cuisine culture, the Minabe Town Ume Cuisine Research Association, which was organized by women from farming families, will form the nucleus of ongoing initiatives. In partnership with ume producers' organizations and local governments as well, it will engage in continued efforts to keep local cuisine culture alive and to communicate this information all across Japan through cooking classes, the development of recipes, and other means. Going forward, the association will also consider the integration of ume cuisine culture into Japanese cuisine as a whole in introducing it overseas.

Items that should be considered from the perspective of Japanese agriculture

1. Resilience

This region has always been exposed to the threat of natural disasters owing to copious rainfall year-round, frequent typhoons, and the rudaceous satoyama soil that readily crumbles.

Ume cultivation has continued about four centuries despite these conditions. This is because the water management function has been excellent and because the diverse forms of agriculture in this area have dispersed the damage from typhoons and other weather events.

i) Superior water management function

The ume system here has substantial resistance to typhoons and other heavy-rainfall events despite its rudaceous soil and brittle geology, owing to the watershed-conserving function of the coppice forests, the ground-protecting function of sod culture in ume orchards, and the water volume-regulating function of the area's 240 irrigation ponds.

Trees in the coppice forests on and around mountain tops store rainwater and release it gradually. This prevents erosion and crumbling of ume orchard soil and supplies moisture in times of drought.

Sod culture, which entails growing various herbs in the orchards and mowing them when they attain a certain height, stabilizes the topsoil of orchard slopes and keeps it from drying out.

Irrigation ponds provide a stable year-round water supply. Additionally, when it rains they prevent excess rainwater from flowing into rice paddies and upland fields, and mitigate river flooding as well.

These functions have been properly maintained by means of agriculture centered on ume cultivation and charcoal making.

ii) Agricultural diversity alleviates farmers' economic losses during disasters

Growing a wide array of ume varieties with different harvest times and applications mitigates farmers' economic losses caused by natural disasters and reinforces resistance to disasters. As described previously, in late May of 2011, Typhoon Songda caused serious damage including fallen ume. However, early-maturing ume escaped damage because they had already been harvested, and many of the ume knocked from the trees by the typhoon were used for making beverages and *umeboshi*.

This area produces mainly ume in combination with a wide array of 67 crops for diversified farming. These include orchard crops, vegetables, flowers, and rice. Furthermore, some ume producers are part-time farmers who also engage in *umeboshi* processing (secondary processing) or charcoal making. These diverse operations help stabilize farmers' income, with the result being a resilient food and livelihood system.

Thus, the ume system of this area, which comprises ume cultivation, ume processing, charcoal making, and their associated industries, possesses a resilience that enables it to minimize damage from disasters and quickly recover.

2. Participation of diverse entities

The ume system is sustained by not only the farmers, ume processors, charcoal makers, and others directly involved in the system, but also by a wide variety of organizations.

i) Exchanges between local people and urban dwellers

Efforts are being made everywhere by farmer groups and others to expand their exchanges with urban dwellers by means that include offering hands-on farming experience, and thereby

attempt to secure new bearers of ume production.

In the Juryo section of Minabe Town's Honjo district, the "Juryo Ume Tourism Group," which is organized by local women, was central in establishing the Okuminabe Bairin Ume Orchard. It plays the main role in inviting urban area tourists and conducting activities in which farmers tell them about the importance of ume (Photo 42).

Photo 42. Urban visitors tour Okuminabe Bairin Ume Orchard.
(From the February 13, 2014 issue, *Kiiminpo Newspaper*)

The Minabe Town Ume Cuisine Research Association, which is organized by women from farming families, expands exchanges with urban dwellers by holding ume cooking classes and disseminating recipes and other information nationwide.

The Akizuno Garten in Tanabe City, which is operated by local residents, is a green tourism facility whose purpose is urban-rural exchanges. It offers hands-on experience in various farming tasks including ume cultivation.

The two agricultural cooperatives in this area offer "ume picking tours" (Photo 43). Nearly 3000 visitors (2014) including students on class trips visit from other prefectures during the tour period and deepen their understanding of agriculture through publicity for this ume-producing district, advertisements to increase Nanko ume consumption, and engaging with local residents.

Photo 43. Visitors learn how to pick ume.
(From the June 5, 2014 issue, *Kiiminpo Newspaper*)

ii) Activities by college students

Tanabe City partners with Agricultural Corporation Akizuno in offering "working holidays on the farm," in which urban dwellers who are interested in agriculture and rural areas help with farm tasks during the busy season, and farmers offer meals and lodging. Farmers not only obtain labor in the busy season; their expectations in terms of securing future farmers are rising. In 2014 a group of Wakayama University students split themselves among farming households, where they gained practical experience harvesting and sorting ume and became acquainted with the farmers (Photo 44).

Photo 44. Working holiday on the farm.
(From the June 8, 2014 issue, *Kiiminpo Newspaper*)

The Minabe Town farmers' group "Collaboration Kitchen" conducts initiatives that publicize ume and other local specialties while carrying on exchanges with universities. For example, the "Pickling Ume Class" held at Kobe Women's University (Kobe City) has increased understanding toward this ume-producing district such that, for example, some

students have expressed their desire to experience staying at a farmhouse. Okayama University has lectures on stimulating local economies using ume as an approach. In these and other ways, the exchanges between universities and farmers are broadening.

iii) Support systems by municipalities and research institutions

In 1973 Minabe Town (at that time Minabekawa Village) was the first municipality in Japan to establish an "Ume Section" in its municipal office to promote the ume industry, and in 2006 Tanabe City created an "Ume Promotion Office." These specialized administrative offices have taken the lead in reinforcing the comprehensive development of this ume-producing region, including everything from production to processing, sales, and dealing with quarantines. In 2004 the prefecture established the Japanese Apricot Laboratory, Wakayama Fruit Tree Experiment Station in Minabe Town. The laboratory works on breeding and cultivating new varieties, and on improving processing techniques.

Wakayama Medical University (Wakayama City) and the Kinki University Faculty of Biology-Oriented Science and Technology (Kinokawa City) work closely with the community to study ume functionality and nutrients. In particular, Wakayama Medical University has created a "Department to Promote Medicine-Agriculture Coordination" to deepen the coordination between medical science and agriculture, and aspires to achieve further advances in ume functionality research.

iv) Minabe-Tanabe Regional Association for GIAHS Promotion

The "Minabe-Tanabe Regional Association for GIAHS Promotion" was established in 2014 (Figure 12). This organization has the participation of not only ume producers, but also the charcoal-making industry, ume processing industry, tourism associations, green tourism promotion groups, cuisine researchers, local historians, university researchers, municipalities, and other entities supporting ume production. The association is to play a leadership role in maintaining the ume system.

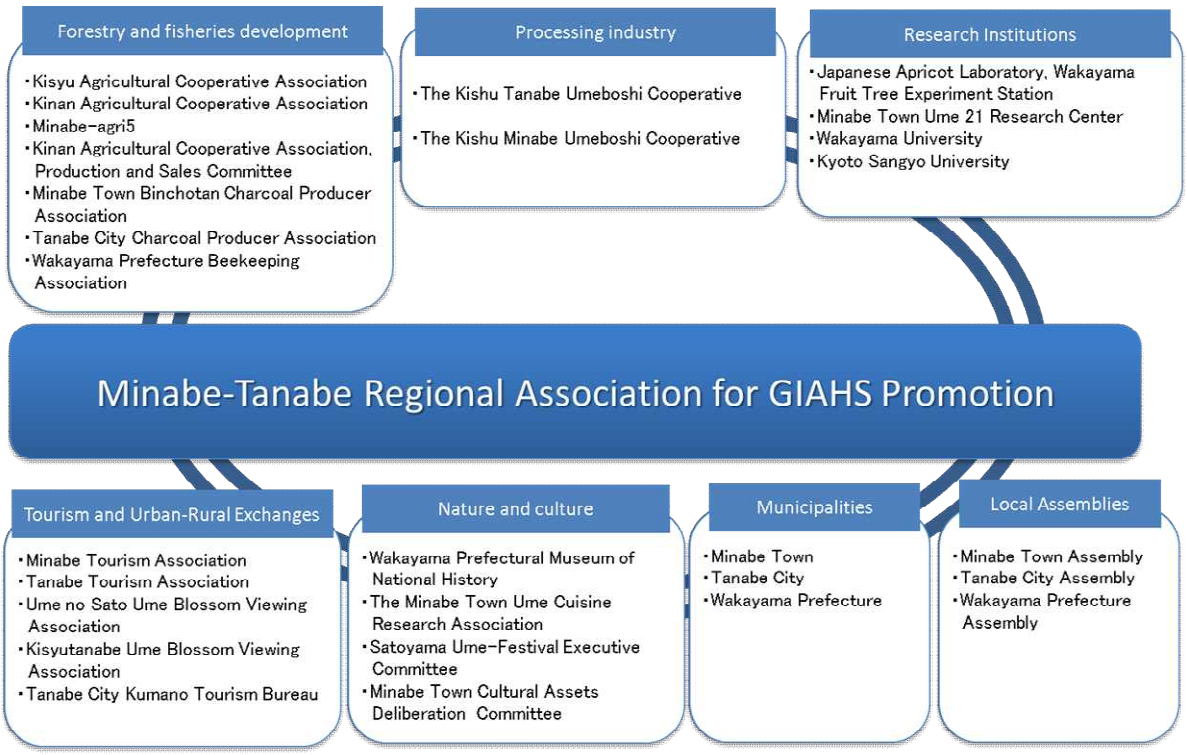


Figure 12. Makeup of the Minabe-Tanabe Regional Association for GIAHS Promotion.

3. Facilitating senary industrialization

Senary industrialization is one of the important elements sustaining the ume system. Ume produced here have always been processed into *umeboshi* and other products for consumption. However, because the blossoms are an excellent tourism resource, farmers have not only produced ume but also coordinated with related organizations in processing, sales, and tourism to develop and offer a variety of products and services. The current estimated production of this area's ume-related industries including production and processing is about ¥70 billion. As such, the ume system contributes greatly to stabilizing farmers' operations and to development of the local economy.

Senary industrialization in this area has the following three characteristics.

i) Integration of diverse allied industries in the locality

Many allied industries are concentrated in this area, including manufacturing and sales of ume beverages and ume liqueur; sales of salt, which is required for *umeboshi* processing; manufacturing and sales of packaging materials; and the tourism industry, which conducts ume blossom viewing and hands-on experience in ume harvesting. Through mutual linkage, these have created much added value and employment.

ii) Establishing division of labor in the ume industry

Around 1900 there was still no division between ume cultivation and processing, and local farmers processed ume themselves. Subsequently, division of cultivation and processing proceeded gradually, and the development of flavored *umeboshi* in the 1970s necessitated sophisticated techniques and facilities for the flavoring stage, leading to an increase in processors who specialize in *umeboshi*. At the same time, farmers cultivated ume but came to specialize in production of *shiraboshiume*, made by pickling harvested ume in salt and sun-drying them. Making their appearance in conjunction with this development were middlemen who coordinated *shiraboshiume* transactions between the two. This division brought higher productivity to all sectors, and enabled them to cope with later increases in *umeboshi* demand.

iii) Enhancing support systems by government and academia

The Japanese Apricot Laboratory, Wakayama Fruit Tree Experiment Station, which was established in Minabe Town by Wakayama Prefecture in 2004, has made major contributions to ume cultivation and processing techniques. Meanwhile, research on the functionality and nutritional characteristics of ume and *umeboshi* is advancing with the involvement of institutions including Wakayama Medical University and the National Institute of Technology, Wakayama College. In this way, a substantial government-academia support system sustains improvements in ume processing techniques and analysis of ume constituents.

Umeboshi, ume liqueur, ume juice, ume bitter orange juice, ume jam, and many other processed items have been developed owing to the collaboration of farmers with processors, research institutions, and other parties. Recently, "Kishu Ume Chicken" and "Kishu Ume Eggs," which are from chickens raised on feed that uses the ume vinegar left after processing *umeboshi*, won the top prize in the 2008 Meat Industry Exhibition's Local Chicken and Brand Chicken Taste Contest. In these and other ways, ume products have met with acclaim. Other one-of-a-kind products such as "Kishu ume pork" and "Kishu ume red sea bream" have been developed, and these are winning notice from consumers. These are examples of how the industry is actively working on cyclical senary industrialization that uses the by-products of ume processing.

This shows that ume have unlimited possibilities as material for processed foods. Even

now efforts to develop sundry products are ongoing.

Because coordination between farmers and allied industries is indispensable for expediting senary industrialization, a collaborative organization called the Kishu Ume Association was founded by farmers, processors, and administrative authorities to share information and exchange views. It has also created a "Choice Umeboshi Certification System" to certify ingredients and quality, and is working toward creating a "Kishu brand."

Farmers are also actively involved in tourism. When the ume blossom-viewing season arrives, the Ume Blossom Viewing Association, which was founded mainly by farmers, works in league with the tourism industry to hold the "Ume Festival." Many tourists come from all over Japan for this lively festival, whose proceeds go partly to farmers.

Thus, farmers in this area have thus facilitated stabilization of their operations while being actively involved in senary industrialization. This is highly significant from the viewpoint of maintaining agriculture, and is basic to sustaining the ume system permanently.

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