



Biological resources



Background to initiatives

The Kirin Group has taken concrete measures toward biological resources from an early stage, including announcing the Kirin Group Declaration of Support for Biodiversity Conservation in 2010, conducting risk surveys and assessments of biological resources in 2011, and announcing the Kirin Group Action Plan for the Sustainable Use of Biological Resources in 2013. Agricultural raw materials often reflect the unique characteristics of the areas that produce them. We must maintain both a local perspective centered on our "dependence" on agricultural products produced in specific "places," as well as a global perspective centered on the fact that climate change has a significant impact on the yield and quality of agricultural raw materials. With our understanding of this background, in addition to scenario analysis based on the TCFD recommendations, we will develop a holistic approach by referring to the LEAP (Locate, Evaluate, Assess, Prepare) approach presented in the beta version of the TNFD Disclosure Framework.

We will create together

A society that values sustainable biological resources



Cultivate, expand and procure sustainable agricultural raw materials



Stand by the side of farmers to make raw material production areas sustainable

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Points

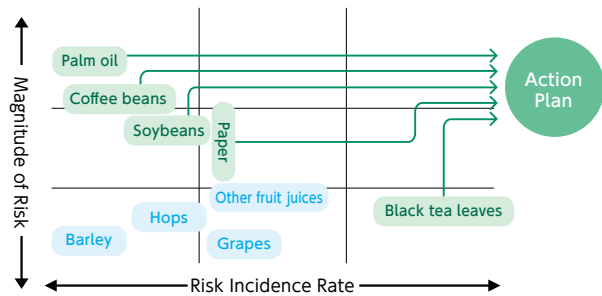
- We revised the Kirin Group Action Plan for the Sustainable Use of Biological Resources to add coffee beans and soybeans as important materials
- The Kirin Group supports 94 tea farms, equivalent to approximately 30% of all large estates in Sri Lanka that have received Rainforest Alliance certification. We began sales of year-round products that use tea leaves from certified farms
- We expanded our support for the acquisition of Rainforest Alliance certification to coffee farms in Vietnam. 309 small farms trained to transition to new certification standards
- We maintained the use of FSC-certified paper or recycled paper for 100% of office paper used in the Japan Alcohol and Non-alcoholic Beverages Businesses
- We participated in the Corporate Engagement Program of the Science Based Targets Network and “The TNFD Forum” of the Taskforce on Nature-related Financial Disclosures, thereby participating in setting targets and creating rules for disclosure related to the use of natural capital

Overview of initiatives

Initiative	Issue	Progress
Initiatives to achieve our vision	Risk assessment	We revised the Kirin Group Action Plan for the Sustainable Use of Biological Resources to add coffee beans and soybeans as important themes (September 2021).
	Rule making	We participated in the Corporate Engagement Program of the Science Based Targets Network. We participated in “The TNFD Forum” of the “Taskforce on Nature-related Financial Disclosures” (TNFD)
Cultivate, expand and procure sustainable agricultural raw materials	Office paper	In the Japan Alcohol and Non-alcoholic Beverages Businesses, as of the end of December 2021, we maintained the use of FSC-certified paper or recycled paper for all office paper (copy paper, envelopes, business cards, etc.)
	Palm oil	The Group continues to ensure 100% use of RSPO Book & Claim-certified palm oil for primary and secondary raw materials.
	Mass plant propagation technologies	Through joint research with Bridgestone, the Kirin Central Research Institute succeeded in developing a technology that utilizes “bag-type culture production technology,” one of a “mass plant propagation systems,” to improve the productivity of natural rubber derived from the “guayule” plant, and began infield assessments.
	Food waste	As we look to achieve our food waste reduction target in the Japan alcohol and non-alcoholic beverages businesses (down 75% by 2025, compared with 2015), we will continue measures such as promoting the use of “year-month labeling” for best-before periods.
Stand by the side of farmers to make raw material production areas sustainable	Tea farms	We have been continuously supporting the acquisition of Rainforest Alliance Certification by Sri Lankan tea farms since 2013, and as of the end of 2021, 94 tea farms had obtained certification, approximately 30% of the total number of large estates that have obtained certification in Sri Lanka. Conducted training on the acquisition of certification at 2,120 small tea farms. Launched a year-round product that uses certified tea leaves (August 2021).
	Coffee farms	In 2020, we began supporting the acquisition of certification by small coffee farms in Vietnam, and from 2020 to 2021, we conducted training on transitioning to the new certification standard at 309 farms.
	Vineyards	Continued ecological surveys to show that converting derelict farming land into vineyards for Japan Wine will enrich the ecosystem. From 2018, we added birds, spiders, and earthworms to the existing list of plants and insects subject to surveys, and researched the impact of maintaining rich ecosystems on grape production. Joined the 30 by 30 Alliance for Biodiversity.
	Hop fields	The Kirin Group discovered a rare species near a new hop field for BEER EXPERIENCE, in which we invest. (We did not conduct a survey in 2021 owing to the spread of COVID-19)

For policies on biological resources→P.118~P.119

Materiality Analysis of Biological Resources



Prepared in 2012 and scheduled for revision in 2021

Progress

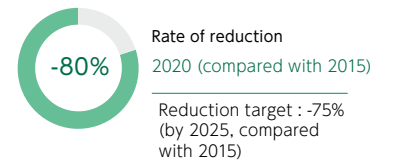
Support for obtaining certification by tea farms in Sri Lanka



Ratio of sustainable raw materials



Food waste





Tea farms

Support for acquisition of Rainforest Alliance Certification

Since 2013, the Kirin Group has supported the acquisition of Rainforest Alliance certification by tea farms in Sri Lanka. As of end of 2021, we had supported the acquisition of certification at a total of 94 tea farms in Sri Lanka, equivalent to approximately 30% of all certified large estates, and in August 2021, we also began sales of year-round products that use tea leaves from certified tea farms.

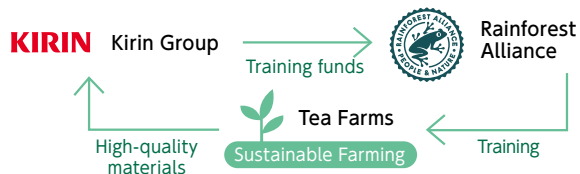
Kirin's high level of dependence on Sri Lanka for tea leaves

Since its launch, we have used tea leaves from Sri Lanka as the main ingredient for Kirin Gogo-no-Kocha, Japan's leading brand of black tea brand with a share of approximately 50%*1 of the domestic packaged black tea market. When we conducted a biodiversity risk assessment in 2011, we learned that approximately 25%*2 of the Sri Lankan tea leaves imported by Japan were used for Kirin Gogo-no-Kocha. We also considered purchasing tea leaves from certified farms to reduce risk from

Share of tea leaves imported by Japan by area of production



Supporting Growers Obtain Rainforest Alliance Certification*3



*1 Actual data for 2021 based on research conducted by Food Marketing Research Institute Co., Ltd.
 *2 Source: 2011 Tea Statistics, Japan Tea Association
 *3 Certification is awarded to farms that meet comprehensive standards for sustainable agriculture to create a better future for people and nature.
 https://www.rainforest-alliance.org/lang/ja

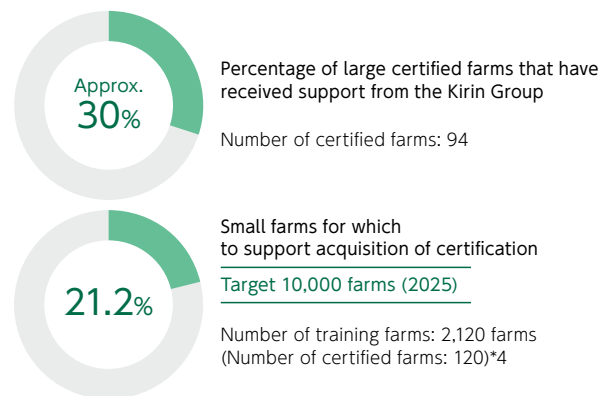
our high level of dependency. But at the time, Sri Lanka was in the immediate aftermath of a civil war and we found the number of farms that were able to access training themselves was limited. Therefore, rather than leaving behind such farms, we decided to create a positive impact on the sustainability of the production area as a whole by supporting the acquisition of certification by tea farms in Sri Lanka in order to build better partnerships with production areas and the people who work there and to continue producing tasty and reliable tea drinks.

Training content

Rainforest Alliance certification program is made up of three principal pillars of sustainability: "environment," "society," and "economy."

In terms of "environment," we provide guidance to tea farms on matters such as forest conservation, surveys and protection of wildlife, trash sorting, and recycling.

In terms of "society," items related to human rights are subject to examination, such as the improvement of working conditions and living environments for tea pickers. Certified farms make efforts to improve the lives of farm workers, including by



*4 The target for small farms was a cumulative total of 5,350 farms between 2022 and 2024, but in 2021, it was difficult for trainers to visit farms owing to strict curfews, etc., as a result of the spread of COVID-19, and we were not able to provide training at small farms.



Kirin Gogo-no-Kocha Straight Tea using tea leaves from certified farms 250ml LL Slim



Wildlife panel



Left: before soil runoff prevention measures, right: after measures

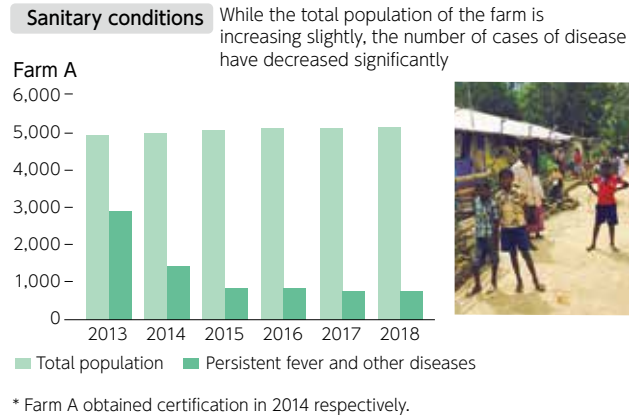
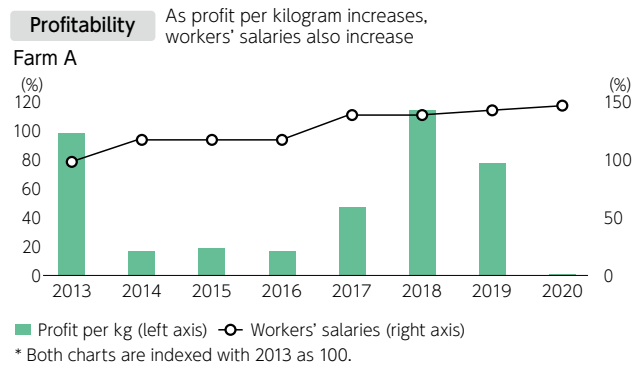
creating clinics on farms and providing homes for tea pickers. In terms of "economy," we provide training related to agricultural technology itself. Farmers in developing countries generally face problems such as poor agricultural knowledge and skills, and excessive use of pesticides and fertilizers. We not only protect forests, but also reduce spending, improve farm profits, and enhance tea leaf safety by teaching scientific methods of increasing yields while reducing agricultural chemical and fertilizer use in our training. Droughts and heavy rains are frequent in Sri Lanka due to the impact of climate change. Urbanization, industrialization, soil erosion and outflow as a result of inappropriate agriculture are also major problems. Tea farms are often located on steep, sunny slopes, so heavy rainfall not only causes the loss of fertile soil, but there have also been examples of it causing landslides that kill people living on the farms. In training, we teach people how to identify grasses that have a negative effect on tea cultivation and show them how to ensure the ground in tea farms is covered with harmless grasses with deep roots. This prevents landslides by stopping rain from directly hitting the ground during heavy rain, while also serving to retain water during droughts, making it an effective measure for adapting to climate change.

More information on the impact of climate change on tea leaves →P.79, P.85

Social and economic impact of certification

The figure below shows an evidence social impact at a farm in Sri Lanka that has acquired Rainforest Alliance Certification. This data is from a specific farm, and from it, we may say that our support for certification has a positive impact, both financially and socially, on farms and farm workers, and makes areas where raw materials are produced more sustainable. In an effort to achieve greater sustainability, some farms are utilizing some of the training expenses that Kirin provides to conduct research to significantly increase yields and attempt pesticide-free cultivation, as part of measures that go beyond the standards for certification.

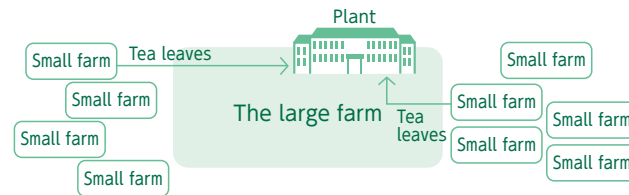
Social impact of supporting the acquisition of Rainforest Alliance Certification



Support for the acquisition of certification by small farms

In 2018, we began supporting the acquisition of certification by small farms, and by 2025, we plan to support the acquisition of certification by 10,000 small farms.

In Sri Lanka there are many small family-operated farms, with the total number said to be in the hundreds of thousands. Nationally qualified collectors collect the tea leaves that small farms produce, and sell them to large nearby farms for processing before shipping. Tea leaves from small farms can sometimes account for as much as half or more of the tea leaves processed in the large farms' plants. We thus determined the acquisition of certification at small tea farms is also necessary for the sustainability of black tea leaves.



In order to obtain certification for small farms, multiple small farms are organized to form a team and appoint a leader. Local trainers first train the leaders, who then train the team's small farms, thus ensuring that they learn about the requirements of the certification standard.

In many cases, we are able to obtain the full cooperation of large farms, including the dispatch of instructors and the opening of training rooms. Since it is necessary, however, to begin by organizing the small farms into a team, it often takes time to start actual training, and the process to obtain certification is perhaps more difficult than the process for large farms.

[More information on the conservation of water sources at tea farms→P.39](#)

Book donations to elementary schools in Sri Lanka

In 2007, the year following the 20-year anniversary of *Kirin Gogo-no-Kocha*, we launched the Kirin Sri Lanka Friendship Project to further strengthen ties with Sri Lankan tea farms and continue to ensure stable production of tea leaves.

In Sri Lanka, unlike in urban areas, schools in rural areas such as those well known as tea-producing areas usually do not have class libraries or substantial libraries, which are taken for granted in Japan. The Kirin Group donates quality books to elementary schools for the children of tea farm workers, and continues to help children improve their academic abilities and envision their dreams for the future. We have already made donations to over 200 schools and plan to continue to increase the number of schools to which donations are made.



Mr. Giri Kadurugamuwa, a trainer (top left), a farm manager (top right), a small farm owner (bottom left), checking the site (bottom right)



Vineyard

Nature Positive at Japan Wine vineyards

We have invited researchers from the National Agriculture and Food Research Organization (NARO), and have been conducting ecological surveys at Château Mercian Mariko Vineyard, on the Jinba Plateau in the Maruko district of Ueda City, Nagano Prefecture, since 2014. In these surveys, we confirmed the existence of 168 species of insects and 288 species of plants, including endangered species listed in the Red Data Book of the Ministry of the Environment, Japan. Many rare species, including endangered species, have also been found in Jyonohira Vineyard in Katsunuma-cho, Koshu City, Yamanashi Prefecture.

In addition to contributing to the expansion of our business, the conversion of derelict farm land into hedgerow-style vineyards for Japan Wine also creates valuable grasslands and contributes to the expansion and protection of Japan's traditional rural Satochi-Satoyama landscapes.



Mariko Vineyard as vast, good-quality grasslands that develops ecosystems

Within nature, there is a kind of nature called "secondary nature" that is protected only by human intervention. Attention has been focused on trends such as the proposal of "Other effective area-based conservation measures" (OECMs) at the Fourteenth Conference of the Parties to the Convention on Biological Diversity in 2018. A typical example is grasslands. Grasslands are said to have covered 30% of Japan's national land area 130 years ago, but they have dwindled to just 1% today. However, the ratio of endangered plants per unit area is



Mariko Vineyard



Château Mercian Mariko Winery



Careful mowing at Jyonohira Vineyard

extremely high (see figure on the top right), and grasslands play an important role in conserving biodiversity.

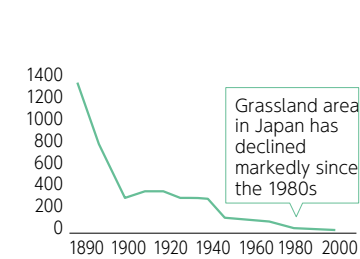
In Japan Wine vineyards, we regularly cut the undergrowth for vertical shoot cultivation, and this has created an environment that functions as high-quality, vast, grasslands, enabling the development of native and rare species, without being dominated by highly fertile plants. Mercian envisions to "make Japan recognized as one of the world's foremost wine regions." As such, in order to produce wine of world-class quality in a stable manner, the expansion of vineyards that Mercian manages itself to secure high-quality grapes on an ongoing basis contributes to creating grasslands and enriching ecosystems. In 2019, in order to also investigate the effects of grass growing on grapes themselves, we began conducting a study of spiders, soil organisms, and birds in the vineyards. For spiders, we start by investigating what they eat.

Surveys of arachnids in Japan Wine vineyards are rare, and we have already discovered *Phaeocedus braccatus*, the fourth specimen of this extremely rare species of spider found in Japan. We have also confirmed the existence of 55 birds from 7 species in vineyards, and 87 birds from 21 species in adjacent forests. We observed many larks, buntings, pheasants, and tits, suggesting that vineyards are functioning as an alternative to grasslands, which are in sharp decline in Japan. We are also investigating earthworms, a kind of soil organism, on an ongoing basis.

Surveys at Jyonohira Vineyard

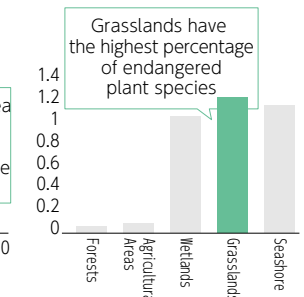
Jyonohira Vineyard in Katsunuma district of Yamanashi Prefecture is a vineyard operated by Mercian that started vertical shoot positioning cultivation in 1984 in an attempt to produce the finest Cabernet Sauvignon in Japan. In surveys conducted between 2018 and 2019, we found many rare species, including Japanese bellflower (*Platycodon grandiflorus*) and silver orchids (*Cephalanthera erecta*), which the Red Data Book of the Ministry of the Environment designates as endangered. More than 30 years have passed since we began cultivation, and we are very careful when cutting the grass, partly because it is a relatively small vineyard, which we speculate is the reason.

Trends in grassland area in Japan



Aggregated from Successive-Year Forest Area Statistics and MAFF Statistical Tables

Number of endangered species by unit area



Endangered plant species per hectare Source: Western Japan Grasslands Research Group (2007)

Rare species found in ecological surveys

Mariko Vineyard



Zygaena nippona nippona

Near threatened species on the Ministry of the Environment and Nagano Prefecture Red List



Sophora flavescens

The only edible grass for feeding *Shijimiaeoides divinus*, a butterfly that the Red List of the Ministry of the Environment lists as critically endangered IA (designated as endangered IB by Nagano Prefecture)



Argyrogonome laodice japonica

Vulnerable species on the Ministry of the Environment's Red List. Near threatened species on the Nagano Red List



Hemerocallis citrina var. vespertina

Near threatened species on the Nagano Red List



Leonurus japonicus

Near threatened species on the Nagano Red List



Vincetoxicum pycnostelma

Near threatened species on the Ministry of the Environment and Nagano Prefecture Red List

Jyonohira Vineyard



Platycodon grandiflorus

Vulnerable species on the Ministry of the Environment's Red List and near threatened on the Yamanashi Red List (NT)



Cephalanthera erecta

Vulnerable species both the Ministry of the Environment's Red List and the Yamanashi Red List (VU)

Tengusawa Vineyard



Argyrogonome laodice japonica

Near threatened species on the Nagano Red List

Studies into the process of converting derelict farm land into vineyards

At Tengusawa Vineyard in Kosu City, Yamanashi Prefecture, we are collaborating with NARO to conduct a research project that is rare even on a global basis, relating to changes in ecosystems as a piece of derelict farm land is converted into a hedgerow-style vineyard that can be harvested.

At Mariko Vineyard and Jyonohira Vineyard, we can only conduct surveys in well-maintained vineyards, but at Tengusawa Vineyard, we can make observations based on the condition of derelict farm land before development. Through these surveys, we believe that we have successfully confirmed that the development of derelict farm land into vineyards enriches ecosystems.

When we investigated derelict farm land prior to its cultivation in 2016, we found only insect and plant species extremely lacking in diversity, as a result of damage from deer eating the vegetation. Since we fenced and reclaimed the area in 2017, however, the landscape has changed to one like a vineyard, and we are seeing how the ecosystem has become richer during this process. In vegetation surveys, we found that after development, the plant life gradually changed from a plant colony of annual grass to one of perennial plants. At present, there are signs of nekohagi (*Lespedeza pilosa*), lawn marshpennywort (*Hydrocotyle sibthorpioides*), and reedgrass, all indicator species for the quality of grassland, as well as Chinese spiranthes (*Spiranthes sinensis*) and spouted bellflower (*Campanula punctata*), and in 2021, we confirmed the existence of 103 species, an increase from the previous year, when it was 88. It is fair to say that, through such signs, we have confirmed that the area is becoming a high-quality grassland. In insect surveys, we also found *Argyronome laodice japonica*, a vulnerable species listed in the Ministry of the Environment and Yamanashi Prefecture's Red Data Book in 2021, and we were also able to confirm the existence of *Ascalaphus ramburi*

The process of converting idle and devastated land into vineyards in Tengusawa Vineyard



and *Nephargynnis anadyomene*, which are vulnerable species in the Kanto area. As such, it is fair to say that Tengusawa Vineyard has become a vineyard with a rich ecosystem, where rare species can thrive. We use butterflies as an indicator, and before the site was developed the only notable species were the pale grass blue and dryads (*Minois dryas*), but around 2019, thanks to the diversification of vegetation on the slopes that we created, the number of observable species increased, leaping to 28 in 2021, from 16 the previous year.

Revegetation activities

In 2016, under the guidance of specialists, we began activities aimed at regenerating rare and native species with the participation of employees, and we have achieved concrete results. Château Mercian has established coexistence with nature, the local community, and the future as an important keywords, and is putting this theme into practice at Mariko Vineyard. In fall, we collect dry grass from areas where there are rare and native species and sow it on the reclaimed land in fields in order to regenerate the vegetation. In the area where we regenerated vegetation, the average number of species present in 2016 was 8.2, but by 2021 this number had increased to 17.9. These areas are steadily becoming high-quality grassland, with tufted vetch (*Vicia cracca*), bromes (*Bromus*), lady's bedstraw (*Galium verum*), queen coralbead (*Cocculus orbiculatus*), Thunberg's geranium (*Geranium thunbergii*),

Evolution of the Tengusawa Vineyard ecosystem

Year of study	number of species	
	Butterflies	Plants
2016	14	36
2018	13	43
2019	18	78
2020	19	88
2021	28	103

Revegetation activities at Mariko Vineyard

Year of study	Average number of species per square meter
2016	8.2
2017	12.0
2018	14.2
2019	16.8
2020	17.5
2021	17.9

Activities to increase shrubby sophora



(Above) Elementary school students from the foot of Mariko Vineyard planting shrubby sophora
(Bottom) Volunteers planting shrubby sophora

toothed ixeridium (*Ixeridium dentatum*), reedgrass, violets, and nekohagi (*Lespedeza pilosa*) also becoming established. Native species with flowers have also become established, and in fall, these areas are like flower gardens.

Activities to increase shrubby sophora

Along with an NGO and local elementary school students, we have begun activities to increase shrubby sophora (*Sophora flavescens*) in Mariko Vineyard. Shrubby sophora is not a rare species at the national level, but it is the sole grass used for feeding *Shijimiaeoidea divinus*, a critically endangered IA (CR) butterfly. In 2019, international NGO Earthwatch Japan and its volunteers collected, with the permission of the rice field owners, cuttings of shrubby sophora from the sides of rice fields near vineyards, and took them home to grow them. Two years later, at the end of May 2021, we planted the seedlings at Mariko Vineyard.

Since 2021, Ueda City Shiogawa Elementary School at the foot of the Jinba Plateau where Mariko Vineyard is located has also participated in activities to increase shrubby sophora. The school grew cuttings taken in 2021 in a flower bed in the schoolyard, and planted them in Mariko Vineyard at the end of May 2022. We also invite a lecturer from NARO and hold environmental classes for students at the school.

More information on our engagement with areas that produce grapes→P.110

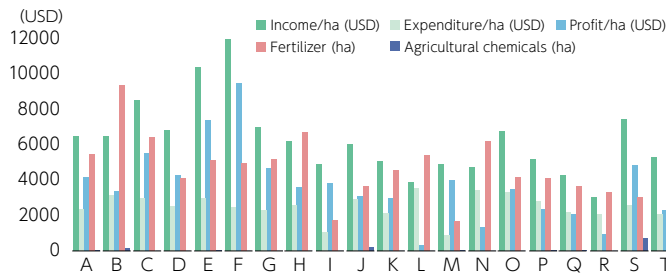
Coffee farms

Support for the acquisition of Rainforest Alliance Certification at coffee farms

Since 2020, the Kirin Group has supported the acquisition of Rainforest Alliance Certification by coffee farms in Vietnam. By the end of 2021, we had provided training for transition to new certification to 309 farmers of arabica coffee. We are utilizing the knowledge we have accumulated by supporting the acquisition of certification by tea farms in Sri Lanka since 2013 to expand our activities to coffee farms in Vietnam.

In 2019, approximately 30% of the coffee beans the Kirin Group imported came from Vietnam, for use in Kirin FIRE and other products. On the other hand, most coffee farms in Vietnam are small farms. As such, the level of agricultural technology is low, and there are farmers who use chemical fertilizers inappropriately owing to a lack of adequate educational opportunities. In 2019, we conducted scenario analysis of the impacts of climate change in 2050 and 2100 and found that coffee bean yields will likely be significantly affected in many countries and regions. We expect that our support for the acquisition of certification, which we began in 2020, will enhance the sustainability of small farms in production areas and contribute to the stable use of high-quality raw materials in the future.

Profit structure of small coffee farms in Vietnam



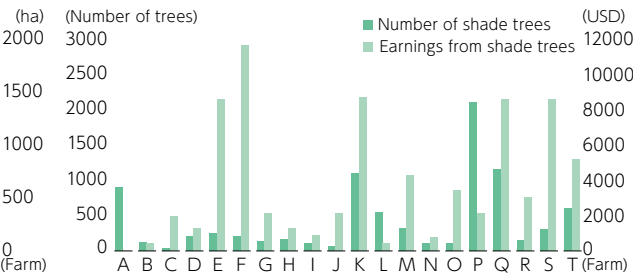
Training based on data analysis

In this activity, we provide training based on data. Specifically, we gained an understanding of data such as the ratio of chemical fertilizers and agricultural chemicals to the income and expenditure of each small farm, the number of shade trees (mainly fruit trees, etc.) that prevent soil drying in direct sunlight and the depletion of coffee trees, and earnings from fruits harvested from those trees. Based on our analysis of the data we collected, we are providing training based on a program we created to contribute to improving farmers' earnings and sustainable production.

[More information on the impact of climate change on coffee beans→P.79, P.85](#)



Data on shade trees in coffee farms in Vietnam



Group training



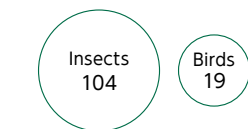
Practical training at a farm

Hop fields

Hop fields living species survey

We have been conducting an ongoing living species survey in the hop fields of contracted farmers in Tono City since 2014. In 2015, the survey confirmed the presence of 104 insect species and 19 bird species. This rich diversity of living species in the hops fields is attributable to the existence of windbreak forests that protect the hops plants, which grow to a height of five meters, from the effects of the wind.

In the fall of 2020, we conducted a survey of the vegetation in the new hop fields of BEER EXPERIENCE, an agricultural corporation funded by Kirin Brewery, in Tono City. As a result, we found there were *Corydalis raddeana*, which are designated as "Near threatened" in the Ministry of the Environment's Red Data Book, as well as *Cynoglossum asperillum*, which is designated as "Near threatened" by Iwate Prefecture. In a survey we conducted in spring 2021, we found *Adonis ramosa*, designated as a "Vulnerable" species by Iwate Prefecture, as well as *Anemone debilis* and *moschatel* (*Adoxa moschatellina*), which are both designated as "Near threatened" by Iwate Prefecture. Next to the hop fields, there are creeks flowing into nearby rice and farm irrigation canals, and the area is also surrounded by forests, ensuring that the soil contains sufficient moisture. We farm the hop fields every year, so the fields themselves do not have the function of enriching vegetation. However, it is fair to say that the creation and maintenance of windbreak forests to aid in the cultivation of hops and the continued functioning of hop fields as rich ecosystems in Japan's traditional rural Satochi-Satoyama landscapes both contribute to the richness of vegetation.



Wind-breaking forests protect the hops from the wind. The Hops fields. Diverse forms of life inhabit the wind-breaking forests planted to protect the hops and the underbrush planted to prevent drying of the ground.

<i>Corydalis raddeana</i>	<i>Cynoglossum asperillum</i>	<i>Adonis ramosa</i>	<i>Moschatel (Adoxa moschatellina)</i>
Near threatened species on the Ministry of the Environment Red List (NT)	Near threatened species on the Iwate Red List	Vulnerable species on the Iwate Red List	Near threatened species on the Iwate Red List

➔ Mass plant propagation technology

Kirin's proprietary mass plant propagation technology

Our research of plants began with beer ingredients such as hops and barley, developed into proprietary mass plant propagation technology in the 1980s. Recently, various sectors are increasingly focusing on this technology for its potential to solve social issues. Kirin's mass plant propagation technology is original and globally unprecedented in that it consists of four elemental technologies: stem propagation technique (organ culture method), sprout propagation technique (PPR method), embryo propagation technique (somatic embryo method), and potato propagation technique (micro tuber method).

Plant propagation is normally performed using seeds, cuttings, etc., but the cultivation period is limited and the growth rate can be quite low depending on the plant. However, Kirin's mass propagation technology that we developed through our own research makes it possible to significantly increase the number of quality plants with the same characteristics as the parent plant, regardless of the season. Kirin's scenario analyses based on the TCFD recommendations that we have conducted since 2018 show that climate change has a significant impact on yields of many agricultural products used as raw materials. Mass plant propagation technology is also useful for the mass propagation aimed at promoting the spread of new varieties that have been developed in response to environmental changes as well as for mass propagation of new varieties, endangered species, and useful plants, and we thus expect it to positively impact the sustainability of agriculture.

Bag-type culture vessel technology

The resin film bag-type culture vessel system that Kirin has developed for mass plant propagation technology offers the advantages of high production and operational efficiency, light weight, low cost, high operational safety, and flexibility in adjusting production size. We aerate a solution containing nutrients necessary for plant growth inside a small bag to allow plants to grow, making it easier to use water more effectively than in soil cultivation and to create a virus/pathogen-free environment. We developed the bag-type culture vessel system from research on the micro tuber method for potato propagation and have enhanced it for use in other propagation technologies.



Bag-type culture vessel system

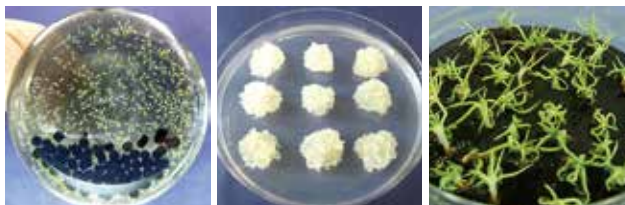
Social impact of mass plant propagation technology

Through joint research with Bridgestone, the Kirin Central Research Institute succeeded in developing a technology that utilizes "bag-type culture vessel technology," a production technology underpinning the commercialization of "mass plant propagation technology," to improve the productivity of natural rubber derived from the "guayule" plant, and began infield assessments. "Rubber trees," which are the main source of natural rubber today, are concentrated in the tropical zones of Southeast Asia, so there is a risk of decreased yields owing to climate change. "Guayule," however, can be grown in arid areas such as deserts, and is thus expected to result in greater capacity to respond to this risk.

Regeneration of coastal forests in the Tohoku Region

For two years from 2014, the Kirin Central Research Institute participated in the Ministry of Agriculture, Forestry and Fisheries project, "Dramatic Improvement of Production of Seeds and Seedlings of *Bursaphelenchus Xylophilus* - Resistant Black Pine for Regeneration of Coastal Forests in the Tohoku Region." We worked to regenerate the coastal protection forests that suffered devastating damage from the tsunami in 2011.

* Agriculture, Forestry and Fisheries Industry/Food Industry Science and Technology Research Promotion Project (lead institution: Forest Tree Breeding Center, Forestry and Forest Products Research Institute, Forest Research and Management Organization)



Cultivation of asexual embryos

Contribution to the lunar farm

The Kirin Central Research Institute took part in the lunar surface base project led by the Ministry of Education, Culture, Sports, Science and Technology launched in 2017, which included industry-academia collaboration research on a pest free farm system and emergency backup system using bag-type culture vessel technology to reproduce growth patterns similar to those under the same atmospheric pressure as on the earth.

World's first cultivation experiment performed onboard the ISS's Japanese Experiment Module "Kibo"

The Japan Aerospace Exploration Agency (JAXA), Takenaka Corporation, Kirin, Chiba University, and Tokyo University of Science, aiming at food production during long-term stays in space for future lunar and other exploration missions, carried out a demonstration experiment of bag-type culture vessel technology onboard the Japanese Experiment Module "Kibo" on the International Space Station (ISS). This was a first of its kind in the world. JAXA is promoting research aimed at setting up farms on the moon and producing food to enable long-term stays without relying on supplies from Earth. Under a framework calling for joint research proposals, in 2017, JAXA began joint research related to bag-type culture vessel technology with a view to its application in space activities. Based on the results of previous joint research, the team performed the experiment onboard Kibo, using lettuce cultivation in a bag-type culture vessel technology to assess the effectiveness of this cultivation method in a micro-gravity, closed environment in space, as well as its advantages over hydroponics and soil cultivation.

The team conducted the experiment over a period of 48 days from Friday, August 27 to Wednesday, October 13, 2021. During the experiment, the team promoted cultivation by ensuring the supply of a culture solution and exchange of air. The team confirmed the existence of true leaves of lettuce on September 10, and subsequently continued to steadily grow the vegetable before harvesting it.



Bag-type culture tank with lettuce

We expect future applications of bag-type culture vessel technology to include not just the mass production of leafy vegetables, but also the virus-free growth of seedlings, which will support long-duration manned planetary exploration missions and large-scale cultivation in spacecraft in orbit and/or accommodation on the moon.



Demonstration experiment for bag-type culture vessel technology onboard Kibo

➤ Palm oil

Use of sustainable palm oil

The Kirin Group uses palm oil as an ingredient in some of its products, but because the quantity we use is very small and it is difficult to procure physically certified oil, we adopt the Book & Claim method approved by the Roundtable on Sustainable Palm Oil (RSPO) for the procurement of certified sustainable oil.

In accordance with our Action Plan for the Sustainable Use of Biological Resources, we have been adopting this method for the total volume of palm oil (excluding palm kernel oil) used as a primary raw material every year since 2013 and the estimated total volume used as a secondary raw material from 2014.

In March 2018, we became an associate member of the RSPO, and in FY2022, we became a full member. Since 2021, we have been a member of the "Japan Sustainable Palm Oil Network (JaSPON)," in order to accelerate the procurement and consumption of sustainable palm oil in the Japanese market as a secondary raw material.

Ratio of Book & Claim
RSPO certification



Primary raw materials
Secondary raw materials

➤ Paper and Printed Materials

Use of sustainable paper and printed materials

In the Action Plan that we revised in February 2017, we declared our aim of using 100% FSC-certified paper or recycled paper in the Japan Alcoholic and Non-alcoholic Beverages Business for all office paper such as copy paper, envelopes, business cards, company brochures, and other printed materials, as well as paper containers, by the end of 2020.

We successfully completed the switch to 100% FSC-certified paper or recycled paper in November 2020.

Currently, we are also promoting the use of FSC-certified paper for paper bags with the KIRIN logo, application postcards for prizes, and some paper cups for tasting.

We plan to expand these activities to other domestic and overseas businesses in the future.

FSC-certified paper
or recycled paper



Paper and
Printed Materials



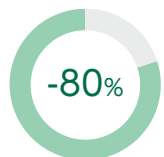
[More information on paper containers and packaging →P.48](#)

➤ Food Waste Reduction and Recycling

Reducing losses from disposing of products

In order to reduce losses from disposing dated and damaged products on an ongoing basis, we optimize production by improving demand forecasts through means such as the close sharing of information on factors affecting demand, such as retail sales, with plants and logistics centers. In addition, we are moving forward with efforts to prevent valuable biological resources and containers and packaging from going to waste by strictly managing sales volume targets.

[More information on the change to "year-month" labelling for production dates →P.68](#)



Kirin Brewery
Kirin Beverage
Mercian

* Actual data for fiscal 2020

Reduction target -75%
(by 2025, compared with 2015)

Continuous donation of surplus inventory* to local governments and food banks

We are making various efforts to reduce food waste, but there are still cases when we cannot avoid generating surplus inventory* as a result of trends in product sales and other factors. Since 2022, Kirin Beverage has donated excess inventory to local governments, food banks, etc., for effective use by those in need.

* Products that have no quality problems and are within their expiration date, but that we cannot ship because they will take a long time to reach customers

Recycling spent grains from beer mashing as livestock feed

Production processes for beer, low-malt beer, and other products generate spent grains after the mashing process. Because such spent grains contain residues of nutritious substances, we utilize them efficiently as livestock feed for cattle, for growing mushrooms, and other applications.

Developing food products from brewer's yeast

Lion continues to supply brewer's yeast for use as an ingredient in

the Australian fermented food, Vegemite.

Reuse of grape press lees

The grape lees from wine-making are turned over in a compost heap on the company vineyard for a year to make compost, which is used as organic fertilizer.

Effective use of shochu lees

Since 2015, we have been supplying some of the distillation residue (shochu lees) generated in the shochu production process at Mercian's Yatsushiro Plant to hog farmers in Kumamoto Prefecture. Farmers used approximately 80% of the shochu lees produced in 2019 as livestock feed.

In 2019, Kirin Holdings, Mercian and the University of Tokyo jointly confirmed for the first time in the world that shochu lees can reduce stress among hogs and improve pork palatability, demonstrating the potential for the effective use and creation of value from shochu lees.

Support for the restoration of nature

Educational program for wildlife conservation in Sri Lanka

Kirin Beverage is funding an educational program for wildlife conservation for young people in tea farms in Sri Lanka. Leopards are at the top of the food chain in Sri Lanka's ecosystem, but local residents often trap and kill them in traps, raising the need for farmers and local residents to understand the importance of ecosystem conservation.

In 2020, a black panther, said to be a mutation of a leopard that was thought to have gone extinct decades ago, was found in a trap. The black panther was sheltered at the Elephant Transit Home in Udawalawe National Park, but unfortunately died later.

In the wake of this incident, Sri Lankan NGOs, the Department of Wildlife Conservation, academic experts, and farm managers passionate about environmental conservation came together to plan a pilot project to educate young tea farmers about the local ecosystem, which Kirin Beverage helped implement through funding support. The spread of COVID-19 delayed the implementation of this project, but in 2021, two seminars for farm employees and students (69 participants in total) were held in March, and a residential workshop for a total of 43 young people was held in Horton Plains National Park in April and October.



Wildlife conservation workshop

Protection of endemic species in biotopes at manufacturing plants

At the Kirin Brewery's Yokohama Plant, in an endorsement of the "Yokohama b Plan," the city's biodiversity action plan, we built a biotope in the grounds of the plant in the summer of 2012. The Yokohama Brewery, which is part of a widespread network of ecosystems, is pursuing initiatives to enrich the local ecosystem as a whole. Since 2012, the brewery has conducted "Tours to Experience the Blessings of Nature"

every week from spring through fall, in collaboration with the Tsurumi River Catchment Network, an NPO with a deep base of knowledge related to the region's natural environment. (We are currently suspending these tours due to the spread of the COVID-19).



The Okayama Brewery biotope

The Kirin Brewery's Kobe Plant has been cultivating local endangered species, including the fish species, *Hemigrammocypris rasborella* (golden venus chub), and *Pogonia japonica*, a species of orchid, in the biotope that we set up in 1997. This biotope functions as a "refuge biotope" for the protection and cultivation of local endangered species.

Since 2005, Kirin Brewery's Okayama Pant has been involved in activities with local communities to conserve the ayumodoki (*Parabotia curtus*), a nationally designated natural monument. Every year, farmed ayumodoki raised by a local elementary school are released into the biotope on the site, and in cooperation with the Organization for the Protection of Ayumodoki in Seto and other specialists, etc., we work to improve the environment to make it easy for ayumodoki to grow, and conduct regular biological surveys. So far, we have not been able to confirm the spawning of ayumodoki, but in a growth survey that we conducted in 2021, we successfully confirmed the spawning of the *Cobitis minamorii*, an endangered species whose spawning environment is close to that of the ayumodoki. We also display our aquariums during brewery tours to raise awareness of the conservation of the ayumodoki.

Vending machines for the support of the Borneo Green Corridor

Kirin Beverage endorses the Ongaeshi "Rewarding" Project sponsored by the Borneo Conservation Trust Japan, a specified NPO that conserves Borneo's biodiversity, and operates vending machines that support Borneo and enable users to make donations to the project. We have installed these vending machines in approximately 200 locations throughout Japan, including offices, schools, general buildings, zoos, and construction sites.

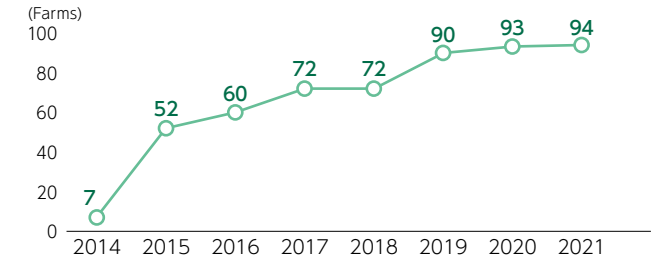


The United Nations Food Systems Summit 2021

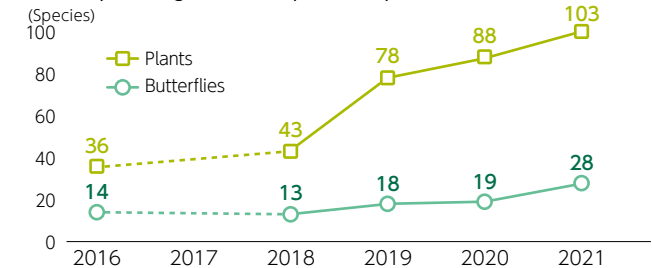
The Kirin Group has made a commitment expressing our support for the United Nations Food Systems Summit 2021 (FSS) to be held in New York in September 2021. In future, we will promote initiatives that contribute to the transformation of sustainable food systems.

Key data related to biological resources

Number of tea farms obtaining certification in Sri Lanka



Recovery of Tengusawa Vineyard ecosystem



* There was no ecological survey in 2017, and we began plant surveys in 2018.

Food waste reduction rate (compared with 2015)

