



Biological Resources

Background

We have utilized scientific tools to analyze and assess risks and opportunities and find solutions to issues related to biodiversity. Agricultural raw materials often bring the unique characteristics of the areas that produce them to be reflected in products. We must maintain both a local perspective centered on our “dependence” on agricultural products produced in specific “places” and a global perspective centered on the fact that climate change has a significant impact on the quantity and quality of agricultural raw materials.

In addition to scenario analysis based on the recommendations of the TCFD, we utilize the processes advocated in the beta version of the TNFD Framework to develop a holistic approach to solving issues related to natural capital including biological resources and climate change.

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

Production regions

- P.44 🌿 Tea farms
- P.46 🌿 Vineyard
- P.48 🌿 Coffee farms
- P.48 🌿 Hop fields
- P.49 🌿 Mass plant propagation technology
- P.51 🌿 Support for the restoration of nature
(Educational program for wildlife conservation in Sri Lanka)

Manufacturing

- P.49 🌿 Palm oil
- P.50 🌿 Paper and Printed Materials
- P.51 🌿 Support for the restoration of nature (Biotopes at manufacturing plants)

Products

- P.50 🌿 Food Waste Reduction and Recycling

2010

Developed the Kirin Group Declaration of Support for Biodiversity Conservation

2012

Conducted materiality analysis of biological resources.

2013

Developed the Kirin Group Guidelines for the Use of Sustainable Biological Resources and the Kirin Group Guidelines for the Procurement of Sustainable Biological Resources, and selected “tea leaves,” “paper and printed materials,” and “palm oil” as important themes. Started supporting the acquisition of Rainforest Alliance Certification by Sri Lankan tea farms

2014

Began an ecological survey at the Tono hop fields and Mariko Vineyard

2017

Revised the Kirin Group Guidelines for the Procurement of Sustainable Biological Resources, and declared our intention to achieve 100% usage of FSC-certified paper or recycled paper in the Japan alcohol and non-alcoholic beverages businesses by the end of 2020.

2018

Started supporting the acquisition of certification by small-scale tea farms in Sri Lanka.

2020

Began expanding support for the acquisition of Rainforest Alliance Certification to coffee farms in Vietnam. Achieved 100% use of FSC-certified or recycled paper for paper and printed materials in the non-alcoholic beverages business in Japan.

2021

We participated in the Corporate Engagement Program of the Science Based Targets Network. We revised the Kirin Group Action Plan for the Sustainable Use of Biological Resources to add coffee beans and soybeans as important materials. We participated in the TNFD Forum.

2022

Became a global pioneer in trialing disclosure based on the LEAP approach advocated in beta version v0.1 of the TNFD Framework. Participated in a demonstration program aimed at the registration of OECMs under the 30by30 international target.



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Targets and Progress

Targets related to support for the acquisition of certification by tea farms in Sri Lanka (CSV commitment: 2022 to 2024, cumulative)

Number of large farms that received training: 15
Number of small farms that received training: 5,350

Target

Actual results

Support for obtaining certification by tea farms in Sri Lanka

KBC



Number of large farms assisted to obtain certification (Number of farms that received training)

Target: 15 farms
Actual results: 4 farms (cumulative total from 2022 to 2024)



Number of small farms assisted to obtain certification (Number of farms that received training)

Target: 5,350 farms
Actual results: 9 farms (cumulative total from 2022 to 2024)

Sustainable raw material ratio

KB

KBC

ME



Ratio of Book & Claim RSPO certification

Primary raw materials (excluding palm kernel oil)



Office paper

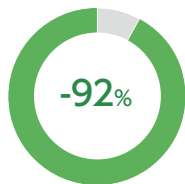
FSC-certified paper or recycled paper

Food waste

KB

KBC

ME



Rate of reduction

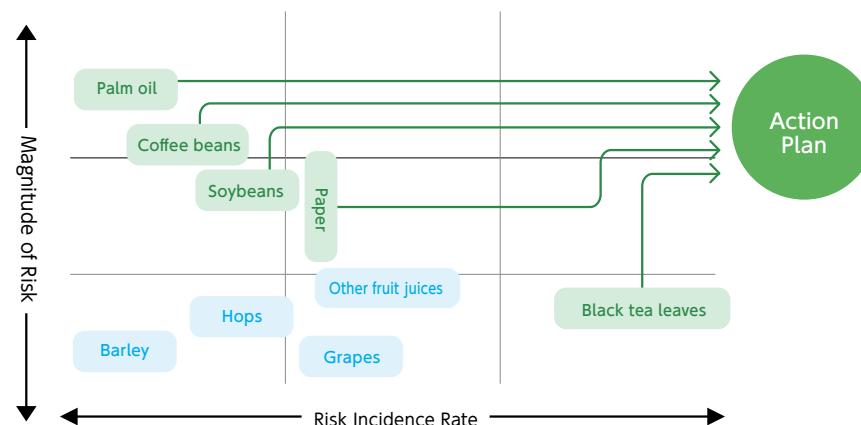
2021 (compared with 2015)

Reduction target: -95% (by 2025, compared with 2015)

Main Activities

- In September 2021, we revised the Kirin Group Action Plan for the Sustainable Use of Biological Resources (established in 2013) to add coffee and soybeans to the existing black tea, paper, and palm oil.
- The Kirin Group supports cumulative total 94 large tea farms, equivalent to approximately 30% of all large tea farms in Sri Lanka that have received Rainforest Alliance certification at the end of 2022.
- We have sales of year-round products that use tea leaves from certified farms (since 2021).
- Over 200 people have participated in educational programs for wildlife conservation in Sri Lanka (2021).
- We have expanded our support for the acquisition of Rainforest Alliance certification to coffee farms in Vietnam since 2020. 350 farms trained to transition to new certification standards and new 309 small farms acquired the certification at the end of 2022.
- 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 (since 2020).
- Mariko Vineyard has been selected as an approved Socio-Ecological Production Landscapes and Seascapes (SEPLS) site contributing to 30by30 in the certification demonstration program of the Ministry of the Environment (January 2023).
- We became a global pioneer with disclosure based on the LEAP approach advocated in the beta version of the TNFD Framework (2022), and conducted scenario analysis together with the TNFD (2023).

Materiality Analysis of Biological Resources

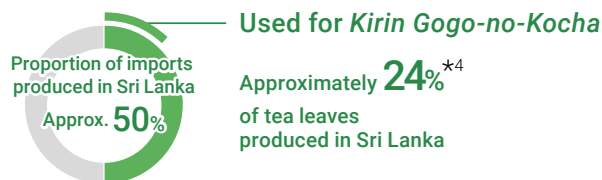


Tea farms

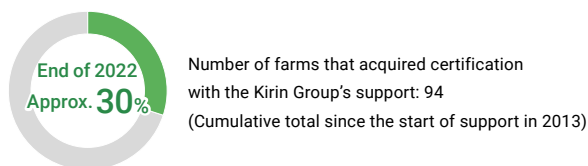
Support for acquisition of Rainforest Alliance Certification

Since 2013, the Kirin Group has supported the acquisition of Rainforest Alliance certification*1 by tea farms in Sri Lanka. As of end of 2022, we had supported the acquisition of certification at a total of 94 large tea farms in Sri Lanka, equivalent to approximately 30% of all certified large tea farms. In August 2021, we began sales of year-round products that use tea leaves from certified tea farms. Since its launch, we have used tea leaves from Sri Lanka as the main ingredient for *Kirin Gogo-no-Kocha*, Japan's leading packaged black tea brand with a share of approximately 50%*2 of the domestic packaged black tea market. When we conducted a biodiversity risk assessment in 2011, we learned that approximately 25%*3 of the Sri Lankan tea leaves imported by Japan were used for *Kirin Gogo-no-Kocha*. We considered purchasing tea leaves from certified farms to ensure sustainable procurement, 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

Share of tea leaves imported by Japan by area of production



Percentage of large certified farms in Sri Lanka as a whole that have received support from the Kirin Group



and the people who work there and to continue producing tasty and trusted tea drinks.

Training content

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.

In the training, we work not just to protect forests, but also to reduce expenditure and raise earnings for tea farms and increase the safety of tea leaves, by providing direction on scientific methods to raise yields while limiting the usage of agricultural chemicals and fertilizers.

Supporting growers obtain Rainforest Alliance Certification*3



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



Cover crops (slope on right side)



Chemical substance storage unit



Training



Room for changing into protective clothing for spraying pesticides



Sorting boxes utilizing spare drums



Panel showing wild animals to be protected



Soil runoff prevention fence



Sign indicating that child labor is prohibited

*1 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>

*2 Actual data for 2021 based on research conducted by Food Marketing Research Institute Co., Ltd.

*3 Source: 2011 Tea Statistics, Japan Tea Association

*4 Source: 2008 Tea Statistics, Japan Tea Association

Tea farms

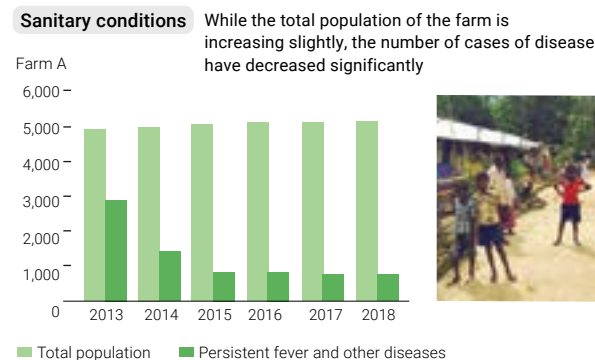
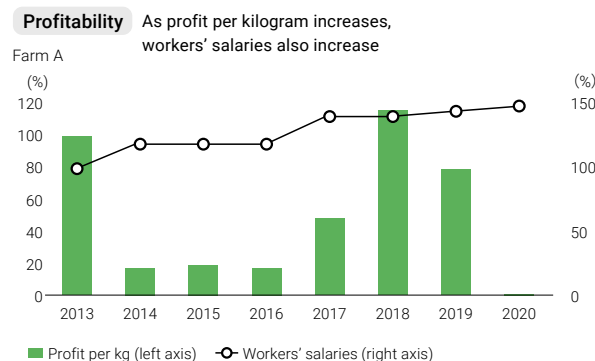
Social and economic impact of certification

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.

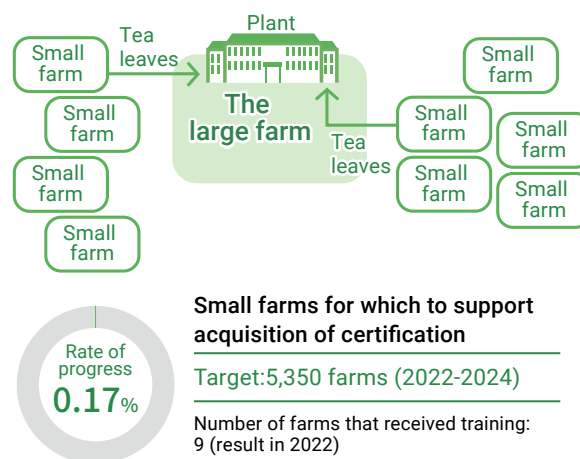
Support for the acquisition of certification by small farms

In 2018, we began supporting the acquisition of certification by small farms with 120 farms certified by the end of 2022. From 2022 to 2024, we plan to provide training to a cumulative total of 5,350 farms. In Sri Lanka, there are many small family-operated farms, with the total number said to be in the hundreds of thousands. Nationally

Social impact of supporting the acquisition of Rainforest Alliance Certification



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. 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.



*1 It was difficult for trainers to visit farms owing to strict curfews, etc., as a result of the spread of COVID-19 in 2021 and 2022, and training was also impacted by the financial collapse of tea farms, meaning we were mostly not able to provide training at either large or small farms.

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 242 schools and plan to continue to increase the number of schools to which donations are made.



Trainer Mr. Giri and farm managers (top left, bottom right) and the master of a small farm (top right), as well as a tea farm (bottom left)

Vineyard

Nature positive at Japan wine vineyards Château Mercian Mariko Vineyard

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 289 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 creates valuable grasslands and contributes to the expansion and protection of Japan's traditional rural Satochi-Satoyama landscapes. Within nature, there is a kind of nature called "secondary nature" that is protected only by human intervention.

Grasslands are a typical example of such nature, and they are positioned as "Other effective area-based conservation measures (OECMs)," which are eligible

Insects
168
species

Plants
289
species



Château Mercian Mariko Vineyard

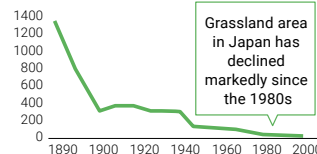


Château Mercian Mariko Winery

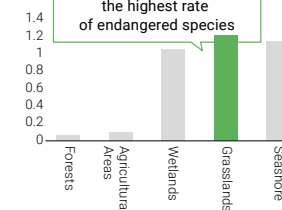


Careful mowing at Jyonohira Vineyard

Trends in grassland area in Japan



Number of endangered species by unit area



for the global target adopted at COP 15 to "make at least 30% of land and sea conservation areas" (30 by 30). 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 extremely high (See figure on the below), 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.

At Mariko Vineyard, we participated in the Ministry of the Environment's certification demonstration program for "Socio-Ecological Production Landscapes and Seascapes (SEPLS) sites" to contribute to achieving the "30by30" target, and the site was "selected" as an "approved SEPLS site," a region held by private-sector companies, local governments, or other organizations with a high amount of biodiversity, in January 2023. We have applied for official certification, which began in 2023 FY, and if the site is certified, we expect the Ministry of the Environment to register it as an OECM in an international database and for us to be able to contribute to achieving the global target set forth at COP 15.

Papers by NARO related to vineyard ecosystem research are as follows.

- **Butterfly diversity in a vineyard developed from abandoned orchards**
Koichi TANAKA, Yoshinobu Kusumoto (2022) Butterfly diversity in a vineyard developed from abandoned orchards. Nodai Entomology 3: 1-7.
https://www.nodai.ac.jp/agri/original/konken/shigen/publication/nodaient_contents/contents/3/3-1.pdf
- **Vineyard bird diversity**
Naoki KATAYAMA, Hiroshi UCHIDA, Yoshinobu KUSUMOTO, Tomohiko IIDA(2022) Bird use of fruit orchards and vineyards in Japan: Mitigating a knowledge gap with a systematic review of published and grey literature. ORNITHOLOGICAL SCIENCE, 21(1), 93-114
https://www.jstage.jst.go.jp/article/osj/21/1/21_93/_article/-char/ja/
- **Recording of rare spiders at Mariko Vineyard**
Yuki G. BABA (2022) Fourth record of the ground spider Phaeoedus braccatus (L. Koch, 1866) (Araneae: Gnaphosidae) from Japan
https://media.niche-life.com/series/009/Niche009_26.pdf

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)



Argyrogonia laodice japonica

Critically endangered II (VU) on the Red List of the Ministry of the Environment and near threatened on the Nagano Red List



Hemerocallis citrina var. vespertina

Critically endangered II on the Red List of the Ministry of the Environment. 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



Argyrogonia laodice japonica

Critically endangered II (VU) on the Red List of the Ministry of the Environment and near threatened on the Yamanashi Red List

Rare spider found in Mariko Vineyard



Phaeoedus braccatus (Gnaphosidae)

The fourth specimen of this extremely rare species to be found in Japan



Calomnata signata (Atypidae)

Near threatened (NT) on the Red List of the Ministry of the Environment and endangered I (CR+EN) on the Nagano Red List

We also conducted the first spider survey in a Japanese vineyard. We confirmed the existence of a rare species of spiders, including a species found for the first time in Nagano Prefecture, endangered species listed in the Red Data Book, and the fourth specimen of a rare spider found in Japan.

Vineyard

Studies into the process of converting derelict farm land into vineyards

Château Mercian Tenguasawa Vineyard

At Tenguasawa 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 Tenguasawa 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, in 2021, we confirmed the existence of 103 species, an increase from the previous

year, when it was 88, and by 2022, this number had risen to 108 species. 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 found *Argyrogonome laodice japonica*, a vulnerable species listed in the Ministry of the Environment and Yamanashi

Evolution of the Tenguasawa 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
2022	30	108

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



Prefecture's Red Data Books in 2021, and the number of observable species increased, leaping to 28 in 2021 and 30 in 2022, from 16 in 2020.

Revegetation activities

In 2016, under the guidance of specialists, we have started restoration activities with the participation of employees to expand the habitats of rare and native species in the fields, and we are seeing tangible results. Château Mercian has established coexistence with nature, the local community, and the future as 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 lands in order to regenerate the vegetation from seeds in the dry grass that we have sown. 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.

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 *Shijimiaeoides 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

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



(Upper) *Sophora flavescens* planting by elementary school students at the foot of Mariko Vineyard
(Lower) Volunteer *Sophora flavescens* planting and cuttings

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 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 have hold environmental classes for students at the school.

We are continuing the above initiatives in 2023.

Coffee farms

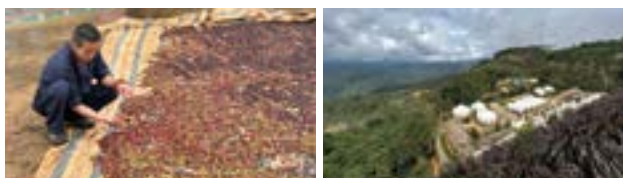
Since 2020, the Kirin Group has supported the acquisition of Rainforest Alliance Certification by coffee farms in Vietnam. We are utilizing the knowledge we have accumulated by supporting the acquisition of certification by tea farms in Sri Lanka since 2013 to expand our activities to coffee farms in Vietnam. By the end of 2022, 350 farmers growing robusta were certified and 309 arabica coffee farmers who were certified by UTZ prior to its merger with Rainforest Alliance have completed the transition to Rainforest Alliance certification.

Starting from the spring of 2020, immediately after we began providing support, we entered a prolonged period when it was difficult to conduct on-site visits owing to the global spread of COVID-19. In October 2022, we took advantage of the removal of most restrictions on travel in Vietnam and Japan to visit small farms receiving support in Da Lat City, the provincial capital of Lam Dong Province, located in central south Vietnam, with an elevation of 1,500 meters.

At the farms we visited, we learned of issues such as the fact that despite the government recommending that people become coffee farmers, there was little technical instruction and farmers were lacking in agricultural knowledge, as well as recent spikes in fertilizer prices. Meanwhile, we have confirmed that among farmers of robusta coffee, which requires space between trees, an increasing number of farmers are using organic fertilizers, which are cheaper and also have less impact on the environment than chemical fertilizers. In the beautiful coffee-producing region of Da Lat, where we visited, we learned that, in relative terms, growing coffee has become less appealing for farmers, with some farmers increasing their income by destroying half of their farms to create tourism facilities, etc. Going forward, we will continue site visits and working to solve local issues based on an understanding of factors such as the circumstances of local small farms and the support activities of suppliers and Rainforest Alliance trainers in local areas. In this way, we will continue to support the production of sustainable coffee beans from the dual perspectives of the environment and society at small farms in Vietnam.



Arabica coffee farms



Drying of the coffee fruit (robusta)

The picturesque coffee bean producing region of Da Lat

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, we confirmed the existence of 104 species of insects and 19 species of birds. 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 asperrimum*, 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.

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.



Diverse forms of life inhabit the wind-breaking forests planted to protect the hops and the underbrush planted to prevent drying of the ground



Corydalis raddeana

Near threatened species on the Ministry of the Environment Red List (NT)



Cynoglossum asperrimum

Near threatened species on the Iwate Red List



Adonis ramosa

Vulnerable species on the Iwate Red List



Moschatel (Adoxa moschatellina)

Near threatened species on the Iwate Red List

➡ 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.



Bag-type culture vessel system

Adaptation measures against global warming

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 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.

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."*

* 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)

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, even under a low-pressure environment that resembles outer space.

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, Kirin began joint research project with JAXA and it related to bag-type culture vessel technology with a view to its application in space activities.

Development of mass plant propagation technology for hops

In 2022, we announced that we had successfully utilized our proprietary "mass plant propagation technology" to increase the propagation of hops seedlings by a factor of 50 or more, using a globally pioneering approach for encouraging the formation of hops axillary buds. We established new technology that at least doubles propagation efficiency, by applying "gibberellin" and "cytokinin," which control the growth of plants, in combination.

➡ 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 have adopted the Book & Claim method approved by the Roundtable on Sustainable Palm Oil (RSPO) for the procurement of certified sustainable oil (excluding palm kernel oil). In accordance with our Action Plan for the Sustainable Use of Biological Resources, we have been calculating our usage of palm oil in accordance with predetermined standards for palm oil used as a primary raw material since 2013 and as a secondary raw material from 2014, and we use RSPO-certified oil for the full amount (excluding palm kernel oil).

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

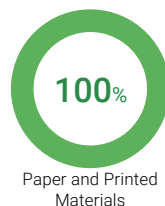
➡ Paper and printed materials

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 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



*1 The Forest Stewardship Council (FSC) Forest Certification System is a system for the appropriate management of forests and the sustainable use and conservation of forest resources. The FSC label is a mark that protects forests.

*2 The information above is current as of June 30, 2022.

Photographs of envelopes, paper cups, etc., may be as of the time that events occurred, and do not necessarily represent the latest versions.

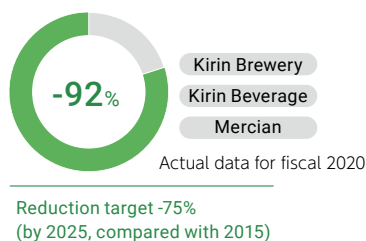
*3 For more information on the use of FSC-certified paper for paper containers, please see "Sustainable Paper Containers."

FSC®C137754

➡ Food waste reduction and recycling

Reduce product waste losses

In order to reduce losses from disposing 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.



Continuous donation of surplus inventory*4 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.

*4 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

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.



Composting site for grape press lees

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. In the six years from 2015 to 2020, farmers have used 7,158 tonnes of shochu lees 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. Livestock feed alone cannot fully cover the amount of shochu lees produced each day, so we are also working on other methods to enable us to dispose of as little shochu lees as possible, including utilizing them as the raw material for compost, and, since 2022, utilizing them in paper factories as a nutrient source for microorganisms in activated sludge. In 2021, our initiatives to utilize shochu lees as livestock feed received praise, and our Yatsushiro Plant won the "Fiscal 2021 Circular Economy Creation Promotion Merit Commendation of the Minister of the Environment," held by the Ministry of the Environment.

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. To date, a total of 200 young people have completed the curriculum, a number of whom have found work in government agencies, the private sector, environmental organizations, and other sectors.



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.

The Kirin Brewery's Kobe Plant has been cultivating local endangered species, including the fish species, *Hemigrammocypripis 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. Our initiatives to date at our Kobe Brewery have won praise, and in 2018, we were awarded the "Fiscal 2018 Greening Promotion Merit Award of the Prime Minister."

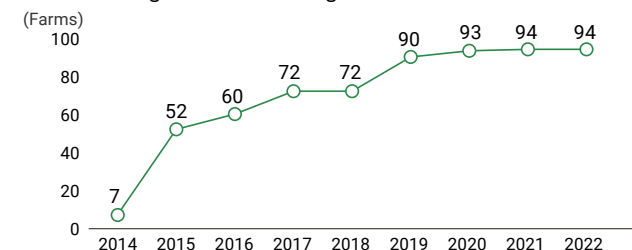
Since 2005, Kirin Brewery's Okayama Plant has been involved in activities with local communities to conserve the Ayumodoki (*Parabotia curtus*), a nationally designated natural monument. Every year, farmed Ayumodoki raised by a local elementary school are released into the biotope on the site, and in 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 ecosystem surveys.



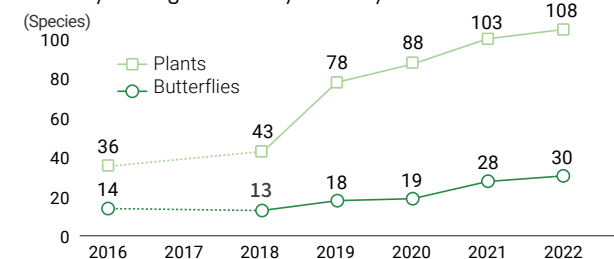
The Okayama Brewery biotope

Key data related to biological resources

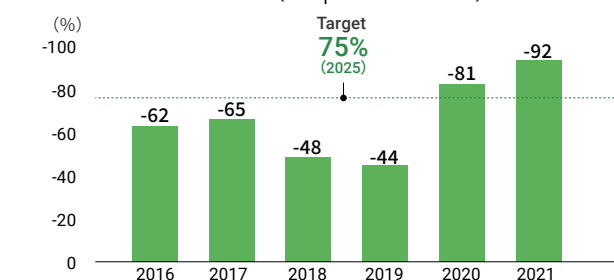
Number of large estates obtaining certification in Sri Lanka



Recovery of Tengusawa Vineyard ecosystem



Food waste reduction rate (compared with 2015)



We provide the latest updates on our initiatives related to biological resources on the following website.

https://www.kirinholdings.com/en/impact/env/3_3/

