



KIRYU INFORMATION



Earthworms are believed to have first appeared on the Earth more than 400 million years ago. With human beings thought have existed for only 4 million years, earthworms have been living on the planet for more than 100 times as long as mankind. There are 13 families of earthworms containing some 3,000 species, with approximately 400 species known to live in Japan. A single earthworm also has the reproductive capability to produce approximately 1,000 new earthworms in just one year. Our company cultivates the species of earthworm known as *Lumbricus Rubellus*. Having found these creatures more fascinating the more we got to know about them, we have devoted 30 years to earthworm research. Like all living things, earthworms are easily affected by their environment, and our earliest research involved a trial-and-error approach to cultivation techniques. We learned to prepare food, water, and cultivation beds according to the seasons, and succeeded in creating an environment which was suitable for the earthworms. After achieving stable earthworm production throughout the year, we began research aimed at detoxifying dried earthworm powder, and established our production technologies. As a result, we succeeded in producing a vacuum freeze-dried earthworm powder that is resistant to acid and heat. Patents for the results of this research are pending in 18 countries, including Southeast Asia, Europe, and the United States.

One feature of vacuum freeze-dried earthworm powder is the cleansing effect which it has inside blood vessels. The human body contains approximately 100,000 kilometers of blood vessels, a length that could circle the earth twice. Medical professionals believe that vascular disorders are related to the causes of many illnesses. Blood vessels function to transport oxygen, water, nutrients, and other substances to the body's tissues, and transport waste from the tissues to the organs which expel it from the body. Disturbances in these functions can lead to illness.

The Earth's petroleum resources are expected to be depleted within 30-50 years, with the effect of making the production of pharmaceuticals more difficult. This is a serious problem with grave consequences for mankind. In order to save the lives of more people from this uncertain future, we are working each day to further our research and development related to earthworms and the unknown powers that they contain. As one part of our efforts to contribute to society, we donate to international aid organizations, the town of Tano where our factory is located, and a broad range of other causes, and will continue to conduct our business as a corporation that is creating the future of life sciences.

Yoichi Ishii President, Kiryu Co., Ltd.

## History

- Jul 2001 Kiryu Co., Ltd. was founded. Capital: 5million yen
- Oct 2001 Completed the factory in Sumiyoshi, Miyazaki City.
- Sep 2002 First land acquisition (1650m<sup>2</sup>).  
Signed an agreement for a factory site at Owaki Industrial Park in Tano Town, Miyazaki City.
- Feb 2003 Completed phase 1 factory construction.
- Sep 2003 Second land acquisition (1650m<sup>2</sup>).  
Total: 3300m<sup>2</sup>
- Mar 2004 Closed and dismantled the Sumiyoshi Factory.  
Relocated some machinery to the Tano Factory.
- Sep 2004 Third land acquisition (1650m<sup>2</sup>).  
Total: 3950m<sup>2</sup>
- Feb 2005 Completed phase 2 factory construction.
- Feb 2007 Completed phase 3 factory construction  
(current state).
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*The only integrated  
production system in Japan  
that covers all stages  
from cultivation  
to powderizing  
and product preparation.*



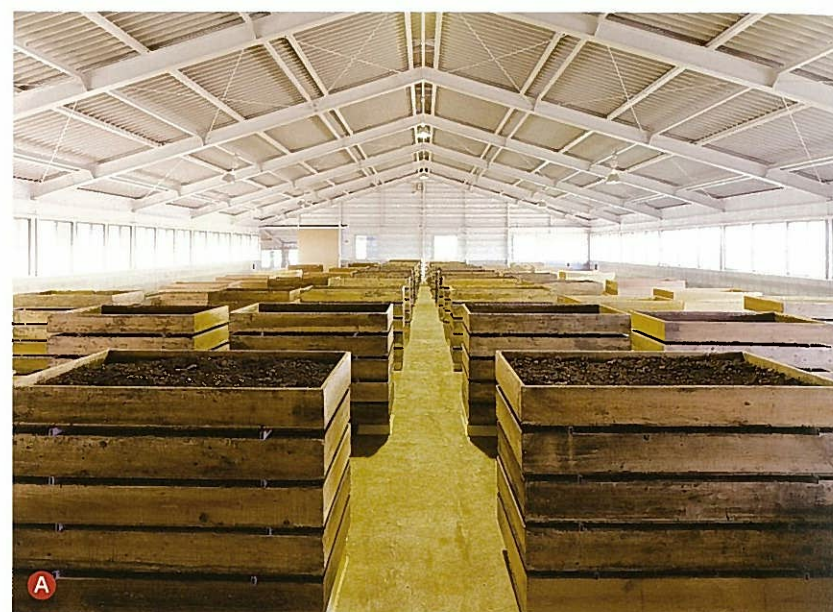


# Breeding & Cultivation *step 1*

At our earthworm farm, we found it extremely difficult to manage earthworms and adapt to changes in the environment using conventional methods of cultivation. When cultivating earthworms outdoors, predators and rain resulted in many losses and we were unable to increase our earthworm count.

We tried cultivation in a plastic greenhouse, and while this solved the problems of wind and rain, the temperature inside the greenhouse during the summer was too hot and the numbers of earthworms fell instead of rising. (Although a suitable amount of sunshine is good, sunshine over long periods raises temperatures too high.) We then raised the ceiling, blocked off the sunlight, and raised the worms in wooden boxes. The breathing action of the wood itself and the use of cultivation technologies made it possible to control factors such as the amount of moisture and the temperature of the cultivation bed(\*), producing conditions that are close to those in nature. We also created a system that allows ventilation and sunlight to be adjusted according to the stage of earthworm growth, and also allows the earthworms to be easily transported both within and outside the farm. Because it is possible to manage the worms by their individual boxes, when there is a problem with the conditions of some earthworms, it is possible to prevent the problem from affecting the other worms. This technique has allowed us to create our current farm, with dramatic improvements in the earthworm environment.

At present, we are continuing our research concerning earthworm cultivation technologies. Grounded in our dedication to a reliable, safe, and stable supply of products, we work every day to produce products which will satisfy our customers.



\*The "cultivation bed" refers to the mounds of earth which contain the earthworms.



- A Cultivation boxes arranged in efficient stacks inside the farm
- B Managing the environment by measuring soil temperature and moisture content
- C Periodic water application using purified water that is produced by our company
- D E F Removing the worms from the soil for shipment by removing the soil a little at a time, utilizing the earthworm behavior of moving away from light
- G Outside of the earthworm farm



# Soil & Shipping *step 2*

## ■ Soil studies

By better understanding the soil conditions and related factors, we will be able to apply our new knowledge to future research and technologies related to earthworm health.

## ■ Removal from the soil and shipping

The earthworms are removed from their wooden boxes on the day before they are shipped.

## ■ Sampling inspections

Samples are taken of the shipped earthworms, and the resulting data managed.

## ■ Process for removing the worms from the soil and shipping them

When the earthworms are shipped, we utilize the nocturnal nature of earthworms (they react to light and tend to move from light to dark places) and remove the soil containing the earthworms from the top a little at a time.

At this time, the earthworms react to the light and burrow deeper and deeper into the soil. Finally when they reach the concrete floor, the shipping box (plastic box) is positioned where the earthworms have clustered together. Time is then taken to carefully remove the waste soil and other substances from the worms.

The earthworms are then weighed.

This long-established method takes advantage of the nature of earthworms as a means of preparing them for shipment.

This sort of earthworm behavior is also applied to great use in a number of ways during cultivation.





# Washing

step 3

## ■Washing the worms

Impurities (such as waste soil) which were not removed at the time of shipment from the farm are removed using citric acid and other chemicals. The worms are then washed clean with microbubble(\*) water, and inspected visually before being processed to a paste and quickly frozen in special dishes.

Work is performed carefully at this time to ensure that the paste contains only the earthworms, and also to avoid damaging the earthworms before they are processed. (If they are damaged, the enzymes begin to activate.) Samples are also acquired and inspected at this stage.

\*Microbubble refers to bubbles of 500μm(0.5mm) or smaller in water.



- A Earthworms after washing to remove waste soil and other substances
- B Microbubble water generator
- C Earthworm paste as it is frozen in a freezer for storage
- D Front of vacuum freeze-drying machine No.2
- E Rear of vacuum freeze-drying machine No.2

# Freezing & Drying

step 4

## ■Storage in a freezer using special dishes

The earthworm paste is stored in special dishes designed to produce a material, size, and other factors that help the paste to freeze rapidly.

## ■Freezing

After the earthworms are washed and processed to a paste, the paste is placed in special dishes and quickly frozen. This temporarily suspends the enzyme activation.

## ■Drying by vacuum freeze-drying machines

The frozen earthworms are placed into the machines and the moisture is gradually removed over 45 hours (approximately 2days). At this time impurities which impede the enzyme function are removed together with the moisture, leading to a high quality product once the powder is created.

This patented drying process dries the paste and maintains the suspended state of the enzymes until they again contact moisture.



## Powderizing *step 5*

### ■ Powder production

This process transforms the earthworms that were dried in the vacuum freeze-drying machines into a powder. Samples are also acquired and inspected at this process.



## Sterilization & Inspection *step 6*

### ■ Sterilization

Although the vacuum freeze-drying machines also have sterilizing effects, this process is performed to again sterilize the powder. Here also, samples are acquired and inspected. The powder which passes the inspection is sterilized to create the product. This process ensures that the product is safe and reliable.

### ■ Shipping

The powder is sealed tightly for shipment, and is shipped only after the samples following sterilization have passed inspection.

- ④ Powder production in the powderizing chamber
- ⑤ Visual inspection of powder samples
- ⑥ Powderizing chamber
- ⑦ Sterilization chamber
- ⑧ Sterilizing the powder
- ⑨ Data management in the sample room
- ⑩ Inspection of product samples





## What is SK Powder?

Earthworms are not lucky enough to grow in the same excellent environment as humans. They have survived due to active ingredients and immunity components equipped to withstand environments contaminated by muddy water, bacteria and viruses.

Because of their reproductive ability and the fact they are hermaphrodites, they can even reproduce without mates. People have eaten earthworms raw or boiled them to alleviate fever and relieve pain and this is a well-known fact in the Chinese herbal medicine field. Earthworms are now receiving a lot of attention from countries across the globe amid ongoing concerns about the exhaustion of fossil fuels. Well-known for his research on earthworms, Darwin in his "Origin of Species" stated: "In the struggle for survival, the fittest win out at the expense of their rivals because they succeed in adapting themselves best to their environment."

Our appropriately named "SK (Super Kinase) Powder" is a freeze/vacuum-dried earthworm powder that incorporates breeding techniques utilizing adaptability, and contains an abundance of active ingredients that were once too difficult to include. Now that we have patented a manufacturing method that makes every effort to eliminate heavy metal, ammonia and other harmful substances, we can supply this product safely, securely and stably.



*Each day, we look at our work from the customers' perspective and strive to provide a reliable, safe, and stable supply of products.*

*For this purpose, we have developed a fully integrated process that covers all stages from cultivation to powder production.*

*In addition to our many years of experience, we also utilize the most advanced science to carry out research focused on the potential of earthworms.*

*This is because we believe that it is our company's responsibility to deliver many customer-pleasing products to the world.*

*Each time we hear from another person who our products have helped, or who is enjoying better health as a result of our products, our staff all renew their efforts. Health is essential for everyone. We hope we can be a partner to our customers at times when their health is threatened.*



