

***Seion-iku*: Takayama Chōgorō's Happy Medium**

Takayama Chōgorō (1830–1886) was a former samurai who began to raise silkworms in 1855, just as Japan was reopening to the world. For six years he failed to raise a healthy crop of cocoons because his silkworms kept dying from poor air quality and fluctuations in temperature and humidity in the nursery. Chōgorō realized that he needed to rethink his entire method, and he began focusing on ways to control the ventilation, temperature, and humidity of his silkworm nursery.

Silkworms are cold-blooded insects and cannot adapt well to changes in ambient temperature or humidity. They thrive only at temperatures between 20°C and 28°C and within a humidity range of about 70 to 90 percent. If it becomes too cold or too dry, the silkworms stop moving and eating, and if it is too hot or too humid, their bodies begin to break down.

Until the 1870s, Japanese silkworm producers used many different techniques to help them raise healthy silkworms. The two most popular were: *ondan-iku*, which used heat from a brazier to warm the silkworms; and *seiryō-iku*, which used a raised monitor roof called a *yagura* to control humidity and air quality. *Ondan-iku* allowed for a shorter growth cycle, but the difficulty of maintaining a constant temperature meant the silkworms often suffered from disease. *Seiryō-iku* produced healthier silkworms that spin longer cocoons, but it lengthened the growth cycle slowing production speed and limiting commercial potential. Chōgorō combined these two techniques into a new method he called *seion-iku*, a portmanteau of their names that literally means “clean, warm production.”

In 1875, Chōgorō built a new nursery building on the grounds of his ancestral home, incorporating his state-of-the-art design. It has large sliding doors that can be opened and closed to cool the building, and the entire structure was raised above the ground on a stone foundation to prevent mold and moisture damage and to keep out rats, which eat silkworms. Braziers kept the silkworms warm, shortening the time it took for the silkworms to grow from 50 days to 28, and *yagura* built on the roof could be opened or closed to control the temperature and humidity inside the building year-round.