

2009

## **Experimental production of wedding dress from high quality silk produced by transgenic silkworm through the collaboration of different industries**

**Hiroaki MACHII<sup>1</sup>, Tetsuya IIZUKA<sup>1</sup>, Hideki SEZUTSU<sup>1</sup>, Naoyuki YONEMURA<sup>1</sup>, Ken-ichiro TATEMATSU<sup>1</sup>, Keiro UCHINO<sup>1</sup>, Isao KOBAYASHI<sup>1</sup>, Chiyuki TAKABAYASHI<sup>2</sup>, Keisuke MASE<sup>1,2</sup>, Eiji OKADA<sup>1,2</sup>, Kenichi NAKAJIMA<sup>2</sup>, Toshiki TAMURA<sup>1</sup>**

**<sup>1</sup> Transgenic Silkworm Research Center, NIAS, <sup>2</sup> Silk Technology Unit, NIAS**

In order to restore the sericulture industry in Japan and create a new industry, it is vital to differentiate domestic silk from low-priced silk produced in China, Brazil and other countries and to develop a method to make silk of high added value. So far, our institute has developed a method to make high quality silk using transgenic silkworms, has developed a new method for reeling silk from transgenic cocoons, and has succeeded in making knit products from fluorescent color silk. However, remaining challenges include standardizing procedures for rearing transgenic silkworms on a large-scale, demonstrating the weaving performance of fluorescent color silk as the warp thread, and instituting a process to obtain final products through the collaboration of different industries.

Therefore, in order to stimulate the practical realization of transgenic silk, we developed a production manual to rear transgenic silkworms, wove a fabric with fluorescent color silks as warp threads, and produced high quality textiles with the collaboration of different industries.

### **1. Improvement of transgenic silkworm strains producing high quality silks and making a manual to rear transgenic silkworms on a large-scale**

We improved transgenic silkworm varieties producing fluorescent silk and ultrafine silk and improved their quantitative traits such as cocoon weight, cocoon shell weight and cocoon shell percentage to equal or exceed the same traits in standard, non-transgenic varieties. We reared 40,000 silkworms of the transgenic varieties with green fluorescent color silk, 30,000

silkworms of the transgenic varieties with red fluorescent color silk, and 140,000 silkworms of the transgenic varieties with ultrafine silk, which produced 8.1kg, 7.5kg and 24.8kg of raw silk, respectively. Moreover, we developed a rearing manual with standardized procedures suitable for the Cartagena Protocol on Biosafety based on the rearing data for these transgenic silkworms.

### **2. Experimental production of wedding and reception dresses from high quality silks produced by transgenic silkworms through the collaboration of different industries**

A wedding dress and a colorful dress to be worn during the wedding reception were made as an experimental production using the high quality silks. Through the collaboration of public sectors and private companies such as Yumi Katsura International Co. Ltd, the wedding dress was made from silk satin "Mikado" woven with green fluorescent silk (Fig. 1). The colorful dress for the wedding reception was made with the satin silk woven with the green fluorescent silk and red fluorescent silk as warp thread and wool thread, respectively, and a silk organdie was woven with red fluorescent silk (Fig. 2). The interweaving resulted in the reception dress having a yellow-green fluorescent color. Moreover, through the collaboration of private companies and public sectors, we made a doll of the emperor and empress dressed in traditional costume with embroidery design using green fluorescent silk and red fluorescent silk (Fig. 3).

High quality silks, such as the fluorescent color silks, produced by transgenic silkworms can provide material for many industries such as



textile, apparel and fashion industries. Therefore, it is an urgent issue to establish a large-scale rearing system for production of transgenic silkworms at the farmer's level which also conforms to the Cartagena Protocol on Biosafety.

**Reference**

Tamura T, Iizuka T, Sezutsu H, Tatematsu K, Kobayashi I, Yonemura N, Uchino K,

Kojima K, Machii H, Takabayashi C, Yamada K, Kurihara H, Asakura T, Nakazawa Y, Miyawaki A, Karasawa T, Kobayashi H, Yamaguchi J, Kuwabara N, Nakamura T, Yoshii K (2009) Production of high quality silks having different fluorescent colors using transgenic silkworms. *AFF Research Journal*, 32(3): 7-10.



Fig. 1 Wedding dress showing green fluorescent color (Texture material: silk satin "Mikado") (Left: white light, Center & Right: blue LED)

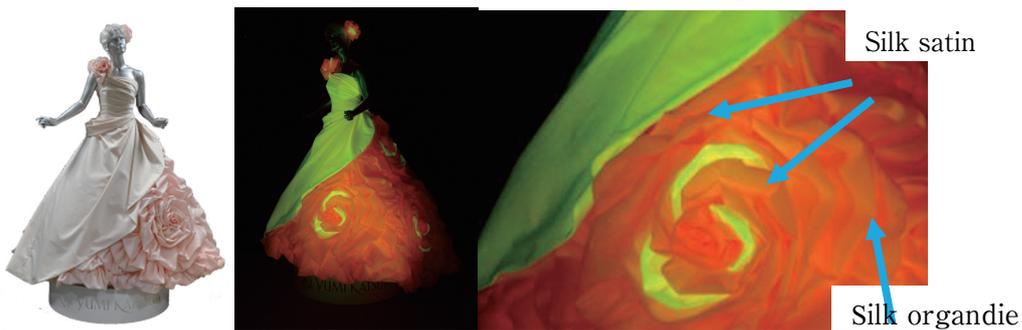


Fig. 2 Colorful dress worn during the wedding reception was made with green fluorescent silk and red fluorescent silk (Texture material: silk satin, silk organdie) (Left: white light, Center & Right: blue LED)



Fig. 3 Doll of the emperor and empress dressed in traditional costume with embroidery design using green fluorescent silk and red fluorescent silk (Upper, left & right: white light, Center two: blue LED)

