

## **Current Biotechnological Research on Silkworm and Insects in Korea**

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The sericulture of Korea, which keeps a history and tradition is dramatically descended after 1976, with the change of country environment inside and outside. Diminishment of traditional sericulture may have been scheduled due to the industrialization of the Korean society. Consequently, with the mission for the maintenance and preservation of traditional sericulture and break-through of sericulture, the new concept on the sericultural business became an inevitable mission.

In 1995, the research announcement that silkworm powder of the 3rd day of fifth instar, manufactured by freezing dry method excels in blood glucose-lowering effects became an opportunity for the conversion into functional sericulture from traditional sericulture. A recent research result showed that the four blood glucose-lowering substances as well as the major component, DNJ (1-deoxynojirimycin), which are nitrogen compounds turned out. As a results of that, the scientific ground of the silkworm power was more strengthened. Thereafter, the research with the functional sericulture, which has been started with silkworm powder continued to the development of dongchunghacho from 1997. The dongchunghacho has proven to be effective for many purposes including fighting cancer, strengthening one's immune system and curing tiredness. The development of the silkworm powder and the silkworm dongchunghacho contributed to the maintenance and preservation of sericulture and sericultural farm income. Another noteworthy accomplishment made was the finding of male silkworm moths as a powerful tonic agent. With this effort, it was possible to raise the additional value of farmers by 5 ~ 6 times.

Recently, the silkworm has received a lot attention as a research source for life science. Specially, useful genes which are related to the function that is unique only to the silkworm and biotechnology by which useful materials are produced through silkworm body were expected since these may ultimately create an unlimited value. One of such effort is trying to utilize the insect defense substances (genes), through which insects are struggled for survive and protect themselves from incoming viral infection. Such substances can be utilized for the development of new medical sources. We have isolated

antibacterial peptide named "Enbocin" and the antibacterial protein "Nuecin" from the silkworm by the differential display method. And, we have cloned the transferrin gene playing an iron transfer and the self-defense system, and cloned the *Bombyx mori* DOPA decarboxylase, which is related to the function of silkworm diapause. Also, we have cloned and characterized fibroin gene from Japanese oak silkworm as a part of research to produce useful protein from transformed silkworm. Currently, we are trying to substitute the fibroin gene for a piece of gene with minimum active unit necessary to fulfil its function. Now, the complete gene which rescues a structure and a function is reaching to 12 genes. Fortunately, we have cloned that PDI (protein disulfide isomerase) that catalyzes the oxidation of disulfides and isomerizes incorrect disulfides on nascent polypeptides undergoing folding. This is feasible by promoting higher structure formation of the recombinant protein using PDI when recombinant protein is produced from insect cells.

In the 21st century, more extensive investigation can be made to elicit the future leftover natural resources. For this purpose, the speed of technological development and investment will be faster. The RDA (Rural Development Administration) started to invest on the biotechnological research project called "Biogreen 21 Program", which will continue for 10 years from 2001. A total of 700 billions is supposed to be invested. About 8% of the money will go to the research field on silkworm and insects. Although, in 2002, it started 7 projects with a 1 billions, but until 2010 years, investment of 50 ~ 60 billions are prospected. With the "Biogreen 21 Program" in RDA, it is expected that insect biotechnological research will accomplish the epoch-making development.