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Revitalizing Silk-Road Silk Industry

- A Case Study in Fergana Region, Uzbekistan -

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Abstract: This study discusses potentials and limitations to reforming traditional sericulture in Central Asia, which is said to have its four-millennium history but has been in a constant decline since the demise of Soviet Union in 1991. Uzbekistan alone produced 23,500 t of cocoon (US$79,252,000) in 2008, contributing to about five percent of the world production. It was the third largest cocoon producer after China and India, while being the world champion in terms of per capita production. In this period, 44% of Uzbek labor force was still in the agricultural sector, which contributed only to 22% of the country's gross domestic product (GDP), and yet 26% of the nation was below poverty line, of which the majority presumably resided in the rural villages. Considering these conditions, the Tokyo University of Agriculture and Technology (TUAT) launched a grass-root technical cooperation project in Fergana Basin in 2009, financed by the Japan International Cooperation Agency (JICA), in order to revitalize local silk production as a model case in Uzbekistan. It was assumed that sericulture was managed by family farms, mainly by women and elders at home, and good income was earned by them in short period of time, so that it would contribute to more balanced distribution of agricultural income among the different farmer classes and genders. After a year of project implementation, interviews were made with the beneficiaries on their perspectives of sericulture promotion, and key factors that would facilitate sustainable cocoon production in Uzbekistan were identified, i.e., flexible planning of production and prompt payment to farmers. While Chinese brokers were actively purchasing cocoons for export, there were promising signs of local institutions in improving silkworm lines and filature facilities. There international technical cooperation was needed with sensible modifications so that it may be accepted well by Uzbek farmers.

Key Words: *Bombyx mori*, CIS, Mulberry, ODA, Rural development

1. Introduction

Uzbekistan is located along the ancient Silk Road of Central Asia, where systematic sericulture started in the 4th Century AD [A)]. It has become famous for colorful silk ikat 'atlas' with arrow-featured splash patterns, and even had banknote printed on silk in the early 19th Century AD [B)]. After the dissolution of former Soviet Union in 1991, the Uzbek silkworm cocoon production overtook that of Japan in 1993 to become the fourth largest producer of the world, and in 1996, eventually passed that of Brazil to be the third producer after China and India [C)]. However, due to economic turmoil after the independence, Uzbek cocoon production dropped from 33,000 t in 1990 to 21,000 t in 1997, when the government of Uzbekistan requested the Japanese government to dispatch sericulture expert for technical cooperation [D)]. In 1998, the public corporation Uzbek Ipagi Association was founded by the President's decree to control from mulberry cultivation to silk processing. Currently Uzbekistan is the first country in the world by per capita cocoon production, and more than 80% of the Commonwealth of Independent States (CIS) cocoon production comes from Uzbekistan [E)].

Meanwhile, Chinese monopolistic dominance in the global silk cocoon market advanced since early 1990s to reach around three quarters of the world production [C)]. In April 2005, the Food and Agriculture Organization (FAO) of the United Nations organized in Tashkent the International Workshop on Revival and Promotion of Sericultural Industries and Small Enterprise Development in the Black, Caspian Seas and Central Asia Region. Twelve countries including Azerbaijan, Bulgaria, Egypt, Georgia, Greece, Japan, Kazakhstan, Republic of Korea, Tajikistan, Turkey, Ukraine and Uzbekistan participated in the forum. Its main purpose was to create partnership among the governments, international organizations and NGOs for reviewing together 'the causes and effects of what went wrong during the last 15 years (since the end of the Soviet Union), and how to fix it right next [F)]. They discussed about policy and financial supports, sharing experiences, scientific knowledge, practical technologies and

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markets in the region, complementing demand and supply for various sericultural resources within the region, reaching out to other regions of the world in search of opportunities for technology transfer to and from, resources and information exchange, trade/enterprise development and catching up with recent trends of consumer tastes, etc. Based on the recommendation of the workshop, the Black, Caspian Seas and Central Asia Silk Association (BACSA) was established for promotion of sericulture production in the thirteen countries, namely Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Iran, Kazakhstan, Romania, Tajikistan, Turkey, Ukraine and Uzbekistan. The association had goals to; 1) generate sericulture projects from external resources, including bilateral and multilateral cooperation; 2) sensitize respective governments and prospective donors; 3) promote local and regional joint efforts which allow the cooperation between the countries of the Black, Caspian seas region and Central Asia to develop concrete actions that fortify the sustainable development of the sericulture in the region; 4) promote making agreements for international scientific-technical cooperation and business relations between the countries involved; and 5) promote market studies, training, and dispersion of sericultural germplasm, and silkworm eggs.

With this political and economic backdrop, the Japan International Cooperation Agency (JICA) chose sericulture as one of the targets of technical cooperation for rural development in Uzbekistan since late 1990s. The Tokyo University of Agriculture and Technology (TUAT), which was founded more than a century ago in the course of Japan's modernization with silkworm science and textile engineering as origins of Agriculture and Engineering Faculties today, launched its project 'Revitalization of the Silk Road Silk Industry in Uzbekistan - Developing a Rural Income Generation Model by the Improved Sericulture in Fergana Valley,' funded by JICA's grassroots technical cooperation scheme from 2009 through 2012. In February 2011, at the occasion of the 10th Japan-Uzbekistan Joint Economic Conference in Tokyo, a memorandum of understanding (MOU) on technical cooperation for sericultural development was signed between Mr. Ilkhom Khaidarov, Chairman of the State Joint-Stock Company Uzbekengilsanoat and Dr. Hajime Fugo, Vice-Dean of Faculty of Agriculture (current Vice-President) of TUAT and representative of the grassroots technical cooperation project [G].

2. Methods

The authors prepared a questionnaire in Japanese which was translated to Uzbek language by Ms. Shohijahon, a local staffer of the TUAT technical cooperation project and Uzbek-Japanese translator, who administered the questionnaire

Fig. 1. Survey sites Yozyovon and Vodil Counties in the Uzbek Fergana Region. (modified form UNEP/GRID-ARENDAL by Novikov V. and Rekacewicz P. 2005**).**

on her routine visit to the project participants at Yozyovon County (40°39'41" N, 71°44'37" E) of Fergana Province (**Fig. 1**), from June through December 2010. The questionnaire asked the participant farmers, of their family members including age, gender, education, job and income, and family assets including buildings, machines and livestock, farm land tenancy, agricultural inputs and crop production. Besides, the following questions were addressed: motive of their project participation, interim evaluation/impression of the project, experience of sericulture in the past, future perspectives of sericulture (promises and limitations), mulberry resources (access to fodder, byproducts, and problems including pests) and open-ended discussion about their life, side business, farmland and challenges. In September 2010, the authors conducted field visits to Yozyovon County and Vodil County (40°10'26" N, 71°43'39" E) of Fergana Province (Fig. 1) for observations of mulberry plantations and silkworm-rearing rooms, and interviews with the participant farmers with interpretations provided by Ms. Shohijahon.

3. Results and Discussion

Out of fifty two (52) participants of TUAT project in Yozyovon County, twenty one (21) participants answered to the questionnaire at the five villages namely Khonobod (1), Korasokol (2), Kotortol (8), Ishtirkhon (6), and Chulguliston (4). Besides, in Vodil Coounty, the head of Vodil 1 Village and other participant farmers invited the authors to two of their silkworm-rearing rooms (**Fig. 2**). Women and old people assumed high responsibilities in taking care of the silkworms [H] as discussed by Kumar (1992).

The image of local farmers was similar to that discussed by Veldwisch and Spoor (2008), as the medium-sized *fermers* and the small *dekhan* peasants were identified in the questionnaire,

Fig. 2. A silkworm-rearing room in Vodil 1 Village, Vodil County of Fergana Province. TUAT Visiting Professor Makoto Iikubo, Program Manager of the JICA grass-roots technical cooperation project (second from the left), with his assistant Ms. Shohijahon (right), giving instructions to the female participant (center) on feeding young autumn silkworms layed out on the bed in front (2010/09/01).

interviews and observations. The *fermers*, upon their good reputation, social standing and political skills, received long-term land rent contract (nine *fermers* ranged from 15 to 115 hectares in our survey) from the state through local administration. They organized farm enterprises consisted of their own family members, and relatives and friends who were *dekhan* peasants themselves. The *fermers* were often influential community leaders but their positions were not fixed; a *fermer* enterprise member might become an 'independent' *fermer* upon receiving contracted land from the state, which could have been a withdrawn land lot from his/her former boss *fermer*. The physical conditions of the contracted farmland were variable, including wetland, saline soils and upland orchards/mulberry fields. The interviewed *fermers* said they were obligated by the state to fulfill their quota production of cotton, wheat and cocoons, the three state-monopoly products, and to take care of orchards planted before, i.e., mostly in the Soviet era, on the contracted land (some *fermers* had purchased such orchard trees from the state). The wetlands and saline soils were left 'free' use for the contracted *fermers* (Veldwisch and Spoor 2008), where they planted rice, sunflower, corn and other crops for market sales. Besides, orchard production (including mulberry if they were saved for fruiting) was also allowed to sell at the market. Meanwhile, in this research five farmers were found renting relatively small two (2) to six (6) hectares from the state, where 500 to 11,000 mulberry trees were planted. Besides cocoon production once a year from April to May, they produced potato, onion, carrot and some fruits for market sales. These five farmers listed their work for cotton harvest from September to November, presumably at *fermer* enterprises nearby. Other six farmers were typical *dekhan* peasants.

All farmers surveyed had 0.2 to 0.5 hectare of private garden lot around their residences, where they planted vegetables and fruits such as potato, carrot, tomato, cucumber, eggplant, bell pepper, chili pepper, pea, soybean, watermelon, melon, onion, cabbage, red beat, garlic, apple, apricot, pomegranate, persimmon, pear, grape, almond, fig and walnut. These products were mainly for family consumption, and sold at the market when surplus was produced. They raised one to six heads of cattle, zero to fifteen heads of sheep, ten to thirty free-range chickens on yard, and dogs and cats. The largest *fermer* also listed twenty ducks and two hives of honey bees. Feces of cattle and other confined domestic animals were used as organic fertilizers for home gardens and orchards. Chemical fertilizers were applied in the farms of cotton and wheat. Farm houses were made of adobe, wood and slate, having three to ten living rooms (with the largest *fermer* had exceptional twenty rooms), where two to three generations working on and/or off farm live together, plus bathroom(s), kitchen(s), toilet(s), vegetable storage, and sheds for domestic animals. The silkworms occupied the living rooms. As they grew large and spread out, some *dekhan* peasants had to give up their rooms to silkworms and slept outside at night under the eaves, according to the interview with them. While the peasants had a bicycle or at best a motorcycle for their means of transportation, the *fermers* were equipped with tractors, trucks and classic Soviet sedans.

All these farmers from the *fermers* to the *dekhan* peasants had been rearing silkworms over generations, particularly a spring breed from April through May, in the slack season on farm between planting of spring wheat in March and planting of cotton in late May. In the early spring from February through March, farmers pruned mulberry trees for their better leaf production. Fall breed had not been raised for long time due to the busiest cotton harvest season from September through November, when all farming family members including students and off-farm employees had to suspend their work for picking cotton on farm. However, as the demand of silk in Uzbekistan was rapidly increasing, the government wanted to augment its production, and TUAT launched fall bleed trial with Vodil 1 villagers (Fig. 2) which eventually failed due to shortage of mulberry leaves infested nationwide by the mulberry pyralid (*Diaphania (Glyphodes) pyloalis* Walker), and by the 80% death of fifth instars intoxicated from the defoliator attached on mulberry leaves, which was applied to nearby cotton fields for facilitating cotton harvest [1].

According to the TUAT project participants, when they were first invited by the head of cocoon collection office in Yozyovon County to join the project, some old farmers remembered of the Soviet era when the state provided them

with a good Japanese breed that produced hard and large cocoons. Another farmer said he expected Japanese would buy their product with better price. Other seventeen (17) farmers answered to the questionnaire that they were just curious about foreign silkworms. On April 9th and 10th of 2010, the hatched Japanese breed silkworms were transferred from the egg paper to mulberry leaves on the rearing bed, while Uzbek breed silkworms were installed on April 18th I). As a result of this advancement for eight to nine days, the Japanese silkworms efficiently consumed the whole, fresh and soft mulberry leaves of earlier spring. The farmers unanimously commented "they ate less mulberry leaves than we expected" and "never let us run after the fodder in short," but so "made us worry if there was anything wrong with the silkworms and they might all die." Some experienced *fermers* said they "noticed very little leftover of mulberry leaves from the first to third instars," and "found no diseases," and that the participant farmers "harvested larger, harder and heavier cocoons than those of local breeds, before the advent of hot summer days." All farmers responded that they were satisfied with the outcome, and became confident of rearing foreign silkworm breed. However, the Japanese technical expert Prof. Iikubo, who periodically circulated among the participant farms during the silkworm-rearing season, observed that the Uzbek farmers were well experienced with silkworms over generations, had basic knowledge and skills as their advantage in technology transfer, while they had a strong traditional value forged by the local market where quantity was prioritized than the quality of cocoons. Hence, dense population of silkworms on their beds, inadequate timing for spinning, insufficient time allowed for pupation and incomplete selection of cocoons were still left as their major challenges I). These types of shortcomings should probably be addressed by systematic training programs (Srinivasa *et al.*, 2007; Singhvi and Katiyar, 2010) together with ongoing on-site instructions. Besides, as many farmers hesitantly expressed their humble wish, flexible planning of the national cocoon production and prompt cash payment on receipt of cocoons, without delay for months to years, should be fundamental conditions for motivating farmers to increase production quality as well as quantity. While brokers from China and other countries were actively looking for Uzbek cocoons for export, promising signs of local institutions were observed in improving silkworm lines and filature facilities.

4. Conclusion

Uzbek tradition of cocoon production could be successfully revived and improved with international technical cooperation if sensible modifications were made for local farmers, and if the state would take measures to gradually deregulate cocoon marketing, which would prompt adequate and timely payments to the producers and thus motivate them for increased quality production.

Notes (web links valid as of 2011/05/15)

A) Encyclopædia Britannica Online
http://www.britannica.com/EBchecked/topic/621059/Uzbekistan/73635/Agriculture?anchor=ref598913

B) Academy of Arts of Uzbekistan
http://www.sanat.orexca.com/eng/4-09/bogoslovskaya_golender.shtml

C) ProdSTAT of FAOSTAT
http://faostat.fao.org/site/339/default.aspx

D) Natl. Inst. of Sericultural and Entomological Sci. - NISES
http://www.nias.affrc.go.jp/newsletter/sansikonchu/n40/n40uzu.htm

E) Uzbek Ipagi Association
http://www.helene.vrc.uz/silk/asso.html

F) Black, Caspian Seas and Central Asia Silk Association
http://www.bacsa-silk.org/en/the-tashkent-workshop-2005/

G) Tokyo University of Agriculture and Technology - TUAT
http://www.tuat.ac.jp/~jica-uz/MOU.html

H) The Silkworm
http://silkwormmori.blogspot.com/2007/07/exclusive-interview-with-dr-panomir.html

I) Tokyo University of Agriculture and Technology - TUAT
http://www.tuat.ac.jp/~jica-uz/sericulture.html

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