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Analysis of the Status Quo of the Sericultural Standard System in China and Its Future

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Abstract This paper summarizes and analyses the status quo of the sericultural standards system in China, and points out the characteristics and existed problems of sericultural standards in China. In addition, the future of the sericultural standards system is discussed.

Key words Silkworm, Standards, Status quo, Future

With a history of more than 5000 years, silkworm has made significant contributions to human being's material and spiritual civilization^[1-2]. The standards of sericulture are not only a significant symbol of modern silkworm, but also a definite requirement for the agriculture advancement^[3-4]. Along with the progress of trade liberalization and economic globalization, standardization has become the principle form of new trade protectionism in developed countries^[5]. Through decades of development, the sericultural standard system has covered every aspects of sericultural industry, from mulberry seedling plantation to cocoon selection, from products quality to the methods standards, forming the sericultural industry standard system framework, which enhances the quality of silkworm, promotes the adjustment of industrial structure and increases farmers' income^[6]. However, compared with other industries, silkworm and mulberry standardization is relatively stagnant, and the existed standard structure lags behind the demand of sericultural industry.

1 Status quo for standards of sericulture system in China

1.1 Outline of the existed sericultural standards in China

The first standard related to silkworm and mulberry was promulgated until 1997 (NY326 – 1997 The F1 hybrid eggs of silkworm and NY/T 327 – 1997 The testing rules for F1 hybrid eggs of silkworm), nearly 20 years later than raw silk standards. In the last few years, China has invested so much on standardization that the formulation of standards of sericulture in China achieved fast developments. Until now, there are 25 national and industrial standards regarding sericulture, and five more national standards and two more industrial standards are being developed. Among those standards, products standards and procedure standards accounted for 38.46%, method standards for 17.95% and inputs standards

for 5.13%. (Table 1).

1.2 Status quo of local standards Influenced by different climate and regional environment, each province is actively formulating and promoting local standards, which provide effective insurance for the development of sericultural industry. Until November 2011, there were 206 local standards promulgated in fourteen provinces such as Guangdong, Guangxi, Anhui, Jiangsu, Henan, Zhejiang, Chongqing, Sichuan, Shandong, Xinjiang, Shaanxi, Guizhou, Yunnan and Shanxi, among which 34 standards are about the quality production of sericulture, 48 standards about mulberry production, 76 standards about silkworm breeding, 23 standards about cocoon production, 27 standards about comprehensive utilization of silkworm and mulberry. Besides, there are 34 local standards being made now.

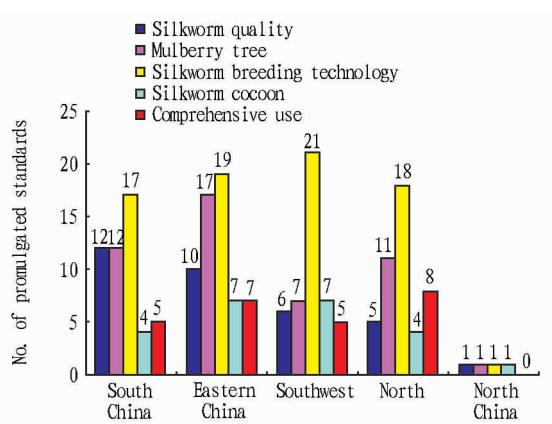
Based on the ecological characteristics in various places, and according to the requirements of convenience, good quality, high – efficiency and ecology, five places have been regionalized for planting mulberry and breeding silkworm, South China subtropical silkworm region, Eastern China silkworm region, southwest hilly silkworm region, Northern China and Northern ecological silkworm region in order to increase farmers' income and stabilize silkworm production (Fig. 1). As shown in Fig. 1, there are many relevant standards regarding silkworm technology, but little information about silkworm cocoon and comprehensive utilization.

2 Characteristics and problems in standard sericulture in China

2.1 Basic formation of sericultural standard system The existed system covers products, methods, procedures and inputs, involving many production links such as mulberry growing, silkworm breeding, and comprehensive utilization. The standard systems focus on silkworm breeding technology, silkworm quality and mulberry trees. Taking silkworm – breeding technology as an example, there are 82 related standards around China, covering cold storage, soaking, breeding, and diseases inspection and prevention.

Table 1 National standards of sericultural industry and status quo of industrial standards

No.	Classification	Standards name	Standard No.
1	Products	Seed and sapling of mulberry	GB19173 – 2003
2	Procedure	Test code for seeds and sapling of mulberry	GB/T 10177 – 2003
3	Procedure	The technical rules for chemical application in mulberry field	NY/T 1027 – 2006
4	Products	Parent eggs of silkworm	GB19179 – 2003
5	Procedure	Testing rules for parent eggs of silkworm	GB/T19178 – 2003
6	Procedure	The technical rules for producing parent eggs of silkworm	NY/T1492 – 2007
7	Products	The fl hybrid eggs of silkworm	NY326 – 1997
8	Procedure	The testing rules for fl hybrid eggs of silkworm	NY327 – 1997
9	Procedure	The technical rules for producing fl hybrid eggs of silkworm	NY/T1093 – 2006
10	Procedure	Rules for chemical application in silkworm rearing	NY/T1026 – 2006
11	Inputs	Machine – made cocooning frame	NY/T 1556 – 2007
12	Methods	Identification of the pathogen of pebrine for silkworm	GB/T20395 – 2006
13	Methods	Method for silkworm variety test in production	NY/T1732 – 2009
14	Products	Mulberry silkworm fresh cocoons	GB/T15268 – 2008
15	Methods	Classification of mulberry silkworm fresh cocoons	GB/T19113 – 2003
16	Products	Mulberry silkworm dried cocoons	GB/T9176 – 2006
17	Methods	The methods of mulberry silkworm dried cocoons	GB/T9111 – 2006
18	Products	Silkworm pupa for feedstuffs	NY/T218 – 1992
19	Inputs	Silkworm cocoon drying equipment	NY/T1251 – 2006
20	Methods	The meteyard for the sericulture production base	SB/T10406 – 2007
21	Products	Fibroin and sericin	SB/T10407 – 2007
22	Products	The fl hybrid of tussah	NY1092 – 2006
23	Products	Quality of tussah race	NY/T 1625 – 2008
24	Classification	Regulation of tussah race outdoor rearing	NY/T 1626 – 2008
25	Products	Fresh cocoon of tussah	GB/T10115 – 1988
26	Products	Natural color cocoon of silkworm	Examination
27	Classification	Cultivation of subtropical mulberry	Examination
28	Products	Mulberry fruit	Examination
29	Classification	Environment demands for parents eggs of silkworm	Examination
30	Products	Silkworm quality	Examination
31	Products	Mulberry leaf meal for feedstuffs	SB/T 10998 – 2013
32	Products	Silkworm waste fertilizer	SB/T 10999 – 2013
33	Methods	Lab method for silkworm variety test	Formulation
34	Methods	Description of mulberry variety	Formulation
35	Procedure	Preservation rules for silkworm variety	Formulation
36	Procedure	Technology for dried silkworm cocoon	Formulation
37	Procedure	Technology for dried(fresh) silkworm cocoon	Formulation
38	Procedure	The fl hybrid eggs of silkworm	Revision
39	Procedure	The testing rules for fl hybrid eggs of silkworm	Revision

**Fig.1** Distribution of local standards in different places

2.2 Few national and industrial standards, imperfect structure

Sericultural industry is an industry that combines plantation

and breeding industry, with long production period and wide coverage as well as high requirement of production technology. Although there are only 27 national and industrial standards now, the sericultural industry is becoming diverse, and the comprehensive utilization of byproducts of silkworm and mulberry is developing rapidly as there are products such as mulberry tea, mulberry juice, and cocoon powder in the market. However, the current standard system cannot meet the demands of industrial development.

2.3 A great number of local standards and repetitive structure

In recent years, local governments in China pay increasing attention to standards. There have been 206 local norms. There are more than 60 local standards in East China, a major silkworm production region. There have been over 50 regional norms in South China. The publication of local standard protects the healthy and stable development of sericultural industry in each province.

However, some provinces copy each other's standards, and some relevant governments lack supervision.

3 Suggestions on the development of sericultural standard systems in China

3.1 Perfecting standard system and improving standard quality Although the framework of sericultural standards system has been formed, the existed standard is underdeveloped, and there are few standards related directly to market circulation, which slow down the promotion of standardization. It is imperative to formulate general planning, focus on key point and insist on market priority principle based on overall investigation. It must to enhance the application of international standard rate, to raise sericultural industry standization level, to participate the making of international standards and to facilitate Chinese silk products more competitive.

3.2 Strengthen the construction of mulberry and silkworm quality standardization People who revise and approve the standards not only should be professional, but also be knowledgeable about standardization theories and policy levels. The existed silkworm standardization personnel are people who major in silkworm management or silkworm research, and most candidates are part-time. In the long run, agricultural universities or colleges will be the main channels to cultivate professionals for agricultural development.

3.3 Avoiding repetition in standards There is always repetition in the existed national standards, industrial standards, local standards and company standards. Therefore, each department needs to revise policies and regulations, strengthen cooperation in formulating policies, and avoid contradiction and repetition among local standards, national standards as well as industrial standards so as to establish efficient sericultural product systems.

3.4 Strengthening studies on inspection technology and improving inspection skills The current testing technology for mulberry and silkworm is relatively outdated because it basically depends on traditional manual testing, therefore the scientificity and accuracy of the inspection results should be increased. Con-

venient and fast testing methods and equipment should be studied, and technologies to enhance equipment to detect toxic materials should be developed.

3.5 Increasing scientific research investments and improving standard scientific research level The major reason for the underdeveloped standardization of mulberry and silkworm in China is insufficient fund. Administrative departments should consider increasing investment and cultivating high-educated technicians.

3.6 Strengthening standards training and publicizing The standardization of silkworm and mulberry relies upon the joint participation of entire producers, managers, consumers and administrators. Hence, it is essential to strengthen training programs, to combine practical technological training with agricultural standardization training, to inform them the latest knowledge regarding silkworm and mulberry standards. Moreover, it is necessary to raise people's awareness of scientific production by hosting training classes and establishing demonstration places, *etc.*

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