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Analysis of Production and Sales Situation of Sisal Fiber and Its Products in China

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Abstract Based on results of previous studies, through investigations, the status quo, main advantages and disadvantages of using small hand-power scutchers and large-scale automatic sisal production lines to process sisal fiber were summarized and analyzed; the traditional uses and latest products of sisal fiber were studied, especially the comprehensive utilization of byproducts produced during sisal fiber processing as well as the broad prospects of new sisal products.

Key words Sisal fiber, Comprehensive utilization, Products, Production and sales situation

Sisal fiber, the only hard fiber among hemp fiber, is strong but pliable in texture, and has tolerance to friction, salt, alkaline and corrosion, so it has been widely applied in national defense, transport, fishery, sailing, oil, mining, metallurgy and other industries. Moreover, sisal, a special irreplaceable hemp, occupies an important position in the economy of China. At present, enterprises producing sisal products are developing new products to use it in more fields and seize the international market. For instance, natural sisal fiber is made into reinforcing ribs of door panel, car lining and handrail, and degradable enhanced phenolic molding plastics is made from sisal fiber and fiberglass. In a word, as people constantly develop and utilize sisal fiber, sisal fiber has developed into household goods, medical supplies, building materials, automotive materials, pet supplies and craft supplies from past agricultural products and industrial products^[1].

1 Processing of sisal fiber

1.1 Production lines of sisal According to preliminary investigation, now there are 21 large-scale automatic sisal production lines in China. Among them, Guangxi and Guangdong each have 10 lines, and the rest one is distributed in Hainan Province, with a price of five million yuan per line; the price of a production line of sisal fiber without drying equipment is more than two million yuan. In addition, a scutcher of a large-scale automatic production line need to be operated by 55 workers, and can process about 180 tons of sisal slices everyday (eight hours). Maximum fiber percentage reaches 4.5%–4.8%, and the produced fiber has little water, so its price is 1 000–2 000 yuan/t higher than that produced by a small scutcher. In China, there is large-scale sisal planting and fiber processing in the reclamation system, and most sisal slices are processed by automatic production lines. The fiber processed is good in color, water and impurity content as well as

price. On the other hand, a small scutcher is compact and flexible, and is easy to use; 8–9 people can run it, and 12–14 tons of sisal slices can be processed everyday. A small scutcher is priced at about 5 000 yuan, and is often used in small farms and rural specialized households, but its number in China is unknown. Local production of sisal has a small scale, and it is planted by a household, so traditional, simple and lagging small scutchers (hand-power scutchers) are often used, but the fiber processed can not compare favorably with that produced by automatic production lines from the aspects of color, water and impurity content as well as price.

1.2 Heat machinery factory Zhanjiang Bureau of Reclamation in Guangdong Province established a heat machinery factory, and has obtained obvious effects on the development of sisal automatic production lines. Presently, automatic production lines and most small handpower scutchers in China are produced by the factory, which has made an important contribution to the development of sisal industry in China.

1.3 Business circumstance of sisal farmers In 2011, if a farmer plants 1.33 hm² of sisal and every 667 m² of sisal produces 245 kg of fiber with a price of 7 108 yuan/t, total income reached 34 830 yuan. If fiber percentage of an automatic production line is 4.8%, and cutting and scutching sisal cost farmers 73 and 76 yuan/t, plus 500 yuan of mechanical plowing and fertilizer fee every 667 m², total expenditure reached 25 210 yuan, with a surplus of 9 620 yuan.

2 Production of sisal products

2.1 Sisal enterprises China is the processing center of sisal products in the world, and large-scale enterprises producing sisal products include Guangdong Dongfang Sisal Group Co., Ltd., Guangxi Sisal Group Co., Ltd. and so forth except for pulp mills (Table 1). In recent years, the amount of sisal fiber consumed increases by 10% every year. At present, there is eight million m² of sisal carpet, 7 000 tons of gunny cloth and 6 000 tons of

gauze produced every year, which consume 30 000 tons of sisal fiber, and there are various ropes used for packing and craft products produced^[1].

During recent years, enterprises producing sisal products have a good operating status. For instance, Guangxi Sisal Group Co., Ltd. composed of three branches mainly produces gunny cloth, rope, yarn, twisted thread and rope heart, and 11 000 tons

of sisal products are sold every year, with total income of above 0.1 billion yuan; the sum of annual processing fee and tax is above 36 million yuan every year, so its operating status is good, and the sum of profit and tax varies from 4.5 million to 6.0 million yuan; monthly income of most workers doing product production is about 2 000 yuan, and the maximum reaches 4 000 yuan (Table 2).

Table 1 General situations of major enterprises producing sisal products in China

Company	Location	Chief product	Annual production capacity// × 10 ⁴ t
Guangdong Dongfang Sisal Group Co., Ltd.	Zhanjiang City, Guangdong Province	Sisal cloth, carpet, white palm rope and gauze	2.0
Guangxi Sisal Group Co., Ltd.	Nanning City, Guangxi Zhuang Autonomous Region	Sisal cloth, white palm rope, gauze and carpet	2.5
Langri Special Fiber Products Co., Ltd.	Foshan City, Guangdong Province	Sisal cloth, carpet and yarn	3.0
Kane Special Paper Products Co., Ltd.	Zhejiang Province	Insulating paper	0.4
Hainan Difa Sisal Products Co., Ltd.	Haikou City, Hainan Province	Sisal rope, yarn and cloth	0.4
Others			2.0
Total			10.3

Table 2 Production of sisal products by Guangxi Sisal Group Co., Ltd. in 2010 and 2011^[3]

Year	Product	Income			Expenses		Profit and tax × 10 ⁴ yuan
		Yield of products processed//t	Factory price yuan/t	Annual income × 10 ⁴ yuan	Cost of raw materials × 10 ⁴ yuan	Processing fee × 10 ⁴ yuan	
2011	Gunny cloth, rope, yarn and twisted thread	11 400	11 000	12 540	8 550	3 390	600
2010	Gunny cloth, rope, yarn, twisted thread and rope heart	11 100	9 800	10 878	7 215	3 214	449
Year-on-year increase		300	1 200	1 662	1 335	176	151
Growth rate// %		2.6	10.9	13.3	15.6	5.2	25.2

2.2 Sisal products Sisal fiber can be made into more than 200 products belonging to 12 series, such as spun yarn, white palm rope, gunny cloth, carpet and polishing wheel. Above 40% of metal polishing cloth, high-quality twisted thread, gauze with metal core, craft rope and other products that are popular in the market are exported to United States, European Union, Middle East, Southeast Asia and other countries or regions. Among these products, sisal cloth and rope are two main products in the market, and their sales accounts for above 70% of total sales of sisal products. Since the second half of 2010, due to demand rebounding of polishing industry, the demand of sisal cloth always exceeds supply. Therefore, Guangxi Sisal Group only supplies sisal cloth to main clients to ensure the supply to Thailand, Vietnam and India and stabilize traditional export market. As a newly emerging industry, steel wire heart made from sisal has a large market space at home and abroad, and 20 000 – 30 000 tons of elevator rope heart is needed in China. As gradual approval of high-quality rope heart in the international market, steel wire heart will have a wider market^[2]. According to a previous study, annual production capacity of domestic enterprises producing sisal products totals 0.103 million tons, and it is 83 000 tons for major enterprises. In 2011, 70 500 tons of sisal fiber was produced in China, lacking 30 000 tons, so China needs to import sisal fiber every year when global economy runs normally.

2.3 Testing of sisal products Quality supervision, inspection and testing system of sisal fiber and its products has been estab-

lished in China, and the Quality Supervision, Inspection and Testing Center of Sisal Fiber and its Products of Ministry of Agriculture has been built in Zhanjiang Bureau of Reclamation to primary staff. In addition, our country has established and implemented three national standards for sisal products like *Sisal White Palm Rope* (GB/T15029-1994) and *Sisal Steel Wire Heart* (GB/T15030 – 1994), as well as five industrial standards like *Sisal Yarn* (NY/T255 – 1995), *Sisal Carpet* (NY/T457-2001) and *Sisal Cloth* (NY/T712-2003). Meanwhile, 15 testing standards have been established. At present, the testing center can measure 21 indicators, and 30 standard catalogs of hemp have been built. These standards make testing of sisal fiber and products standard, ensure quality of sisal products, and promote technological advances of the industry and development of sisal industry.

3 Trade of sisal fiber and its products

In recent years, China has become a big country in production of sisal fiber and its products. Demand for sisal products in the home market is large, and sisal products have been exported. In 2010, except for 30 000 tons of sisal fiber imported by Shunde Factory, 27 300 tons of sisal fiber was imported into China, with a value of about 24.20 million dollars. Meanwhile, around 7 501 tons of sisal products (including sisal thread, rope, large rope, cable, cloth, paper pulp and so forth) were exported, with a value of 10.70 million dollars except for 60 million dollars from Shunde Factory (Table 3).

Table 3 Import and export trade of sisal fiber and products in China from January to October during 2009 – 2011

Type	Year	Import			Export		
		Amount//t	Unit price// \$ /t	Total price// \$	Amount//t	Unit price// \$ /t	Total price// \$
Sisal and other agave fiber and short fiber	2009	26 421.4	907	23 964 209.8	133.6	947	126 519.2
	2010	27 047.7	865	23 396 260.5	153.2	1 074	164 536.8
	January – October 2011	29 856.5	965	28 811 522.5	182.3	1 287	234 620.1
Wrapping rope made from agave fiber	2009	0.6	15 221	9 132.6	846.7	1 739	1 472 411.3
	2010	0.2	33 453	6 690.6	500.8	1 949	976 059.2
	January – October 2011	0.02	35 950	719	379.5	2 594	984 423.0
Thread, rope, large rope and Cable made from agave fiber	2009	199.2	2 026	403 579.2	5 474.4	1 384	7 576 569.6
	2010	243.0	3 289	799 227.0	6 847.0	1 396	9 558 412.0
	January – October 2011	39.1	8 472	331 255.2	5 480.8	1 762	9 657 169.6

4 Comprehensive utilization of sisal

Sisal fiber can be made into products, and its waste residue and water also have a wide range of application. Besides, raw materials of expensive drugs like hecogenin and ticogenin can be extracted from sisal juice, as well as oxalic acid, pectin and alcohol. In addition, waste residue can be used as fertilizer and fodder, and its output value is higher than that of fiber products if it is used fully. Additionally, sisal waste water and residue can be made into hemp paste which can be used to produce saponin that can be used to produce more than 200 drugs. Moreover, 100 tons of sisal can be made into one ton of hemp paste with a value of 3 000 – 5 000 yuan, and price of high-quality saponin is above 0.3 million yuan/t. Besides, due to containing cortical hormone and anabolic hormone, sisal saponin can improve immunity, decrease blood pressure and resist inflammation. Presently, among sisal enterprises, besides enterprises producing saponin pay resource fees for using sisal water and residue, other fee is collected according to amount of sisal slices processed. At present, there are three enterprises producing saponin at least in China. In Guangxi, hemp paste is produced in the region where sisal slices are processed, and is sold to enterprises producing saponin. Besides, pectin made from sisal residue can be added to food, and hemp head can be made into hemp thread which is a high-quality material of high-level mattress.

5 Major problems and countermeasures during the development of sisal industry

5.1 Lacking the machine for reaping sisal and low benefit of sisal farmers with weak enthusiasm for production According to a survey, at a high management level, sisal can be reaped after 2.5 years of growth, and the balance between income and expenditure is realized in the third year after reaping, that is, if land fee is not calculated, the balance between income and expenditure is realized in the sixth year. Therefore, sisal farmers' income will be inadequate to meet the expense if they have no other income before, so some farmers plant melon and legume to increase their income. Other farmers can compare the benefit of planting cane, cassava and eucalyptus, and plant other crops instead of sisal, so that sisal production is unstable. In addition, there is no reaper for reaping sisal, and it is difficult to hire civilian workers to reap sisal. Hence, our country should make relative policies to help

them, and speed up development of sisal reaper to make sisal area and yield more stable.

5.2 Unbalanced sisal harvesting and processing in four seasons is not propitious for product producing Affected by international financial crisis in 2008, the demand for sisal products at home and abroad dropped obviously, so that some sisal farmers delayed reaping sisal and producing sisal fiber due to low price and difficult sell of sisal fiber. Moreover, the cost of reaping sisal increased significantly, and labor fee of reaping sisal increased from 30 – 35 yuan/t in 2008 to 70 – 75 yuan/t; peasant workers suggested that it is more worthwhile to cut cane and dig cassava, so it is difficult to hire them to reap sisal, so that sisal supply to sisal processing enterprises was out of joint^[3]. Therefore, to reduce the gap between sisal and cane (or cassava) in benefit, it is unnecessary to improve wage of peasant workers reaping sisal and price of sisal fiber.

5.3 Research and develop new high-quality sisal products to address enterprises' production and working capital Research and development level of a enterprise is closely related to its survival and development, and enterprises must research and develop new high-quality products to make them more competitive on the world market. Sisal products are produced by using the basic principles proposed by Huang Daopo, but material choose, production technology and so forth need to be improved. Quality of steel wire heat is demanded highly, and Guangxi Reclamation Sisal Group's products have been approved by benchmarking enterprises through many years of technical promotion. In October 2011, Guangxi Sisal Group reached trade cooperation with five famous enterprises producing steel wire heat in China^[3]. In addition, due to national macro-policy adjustment and constant shrink of credit scale, it is difficult for enterprises to raise a loan for purchasing sisal fiber, which has adverse effect on sisal farmers, so China should establish some preferential loan policies for small and medium enterprises.

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