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# Strategies for Natural Rubber Production and Development in China

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**Abstract** The world's natural rubber output was 12.31 million t and the consumption reached 12.17 million t in 2015. China's natural rubber output was 0.85 million t and the consumption reached 4.724 million t in 2016. Southeast Asian countries are the main natural rubber producing countries, and ITRC policy affects the natural rubber prices. During 2017–2025, the supply of natural rubber in the world is expected to be abundant to meet downstream demand. Based on natural conditions for rubber planting and production costs, China's rubber production should place emphasis on developing Class I rubber production area, strengthening Class II rubber production area and adjusting Class III rubber production area. It is recommended to build high-output rubber plantations in Class I rubber production area in Xishuangbanna; choose rubber farms with good conditions in Class II rubber production area and build high-quality rubber production base as the dedicated production raw material base for aviation rubber; expand the Southeast Asia rubber production belt for development of natural rubber industry.

**Key words** Natural rubber, Production, Development, Strategies

## 1 World's natural rubber

Natural rubber comes from rubber tree which is most economically important member of the genus *Hevea* because the milky latex extracted from the tree is the primary source of natural rubber. The tree requires a tropical or subtropical climate with a minimum of about 1200 mm per year of rainfall, and no frost. The economic life of rubber trees is 35–40 years, and rubber can be tapped and natural rubber can be harvested 6–9 years after planting, to obtain economic benefits. Traditional rubber tree planting zone is in 10°S–17°N, mainly in the Asian region where the planting area accounts for 90% of that in the world. Natural rubber has been widely planted in Asia, Africa, America and Oceania, and the harvested area increases year by year<sup>[1]</sup>.

**1.1 Output** The world's natural rubber is mainly planted in Thailand, Malaysia, Indonesia, Vietnam, China, India, Cambodia, Myanmar, Sri Lanka, Cote d'Ivoire, Nigeria, Liberia, Cameroon, Ghana and Gabon, with rubber planting area of about 12.8 million ha. The main natural rubber producing countries include Thailand, Indonesia, Malaysia and Vietnam. The world's natural rubber output was 12.31 million t in 2015. The world's natural rubber output during 2005–2015 can be seen in Fig. 1.

**1.2 Consumption** The manufacturing cluster in the Asia–Pacific region has the highest demand for natural rubber, with consumption accounting for 73% of that of the world, and the tire industry consumption accounts for nearly 70%. After the outbreak of world financial crisis in the second half of 2008, the natural rubber demand gradually shrank and the supply growth rate continued to exceed demand growth rate. From 2014, there was an increase in market demand, and consumer demand was improved. In 2015,

there was a slight increase in supply, market demand became weak, and prices continued to fall. In early 2016, the price of rubber was too low, and the supply growth rate was significantly low. As the economy recovered, rubber prices began to rise in September 2016, and the consumption rose to 12.576 million t, indicating that the production failed to meet demand for the first time and prices significantly increased. The world's natural rubber consumption during 2005–2015 can be shown in Fig. 2.

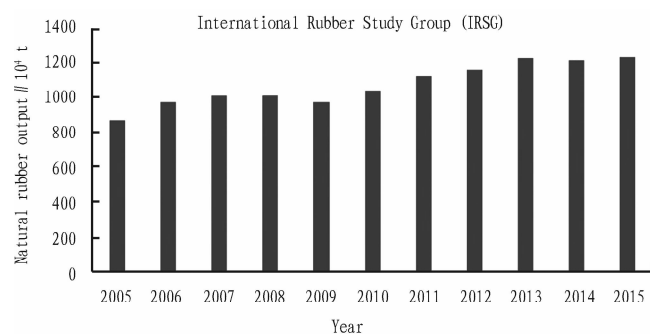


Fig. 1 The world's natural rubber output during 2005–2015

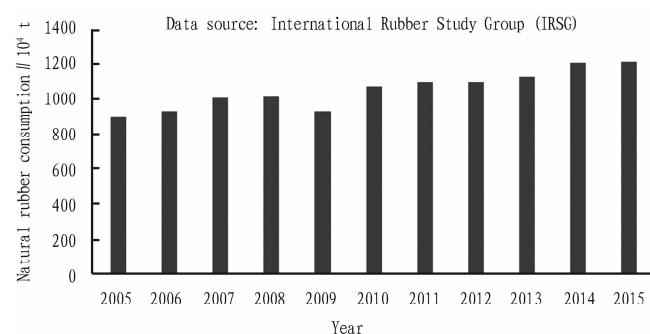


Fig. 2 The world's natural rubber consumption during 2005–2015

## 2 China's natural rubber

**2.1 Output** China's natural rubber is mainly grown in Hainan,

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Yunnan and Guangdong. In 2016, the rubber planting area was 1.14 million ha, and the total output reached 0.85 million t. The rubber planting area was 0.53 million ha and output was 0.4 million t in Hainan; the rubber planting area was 0.57 million ha and output was 0.43 million t in Yunnan; the rubber planting area was 0.4 million ha and output was 0.2 million t in Guangdong. China's natural rubber output during 2006–2016 can be shown in Fig. 3.

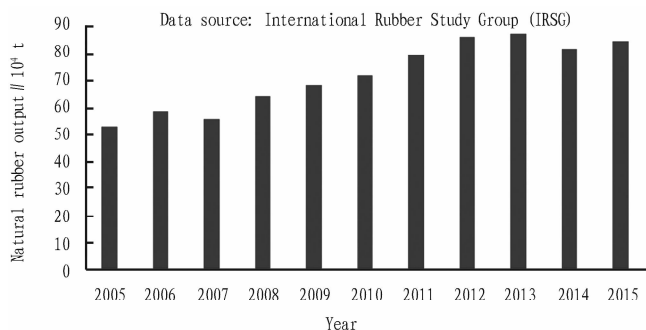


Fig. 3 China's natural rubber output during 2006–2016

**2.2 Consumption** China is the world's largest consumer of natural rubber, and China's natural rubber consumption accounts for around 36% of world's natural rubber consumption. China's natural rubber consumption reached 2.69 million t in 2007, 3 million t in 2009 and exceeded 4 million t in 2013. In 2014, the consumption reached 4.804 million t. After natural rubber prices fell below the cost line in 2015, the contradiction between supply and demand eased and demand slightly increased. With the increase in the price of natural rubber in 2016, the natural rubber consumption increased slightly to 4.724 million t. Data show that the cumulative import volume of standard rubber reached 1.4413 million t from January to November 2016, an increase of 17.9% over last year. In 2016, the cumulative import volume of latex reached 0.2393 million t from January to November 2016, an increase of 4.9%. In 2016, the cumulative import volume of smoked rubber sheet reached 0.191 million t from January to November 2016, an increase of 1.8%. China's annual natural rubber output was 0.8 million t, and the consumption reaches 4 million t, indicating that the production can not meet consumer demand.

### 3 Development trend of natural rubber industry

#### 3.1 Southeast Asian countries as the main natural rubber producing countries

The rubber tree is widely planted in more than 40 countries and regions in Asia, Africa, Oceania and Latin America, and it is mainly planted in Southeast Asia. The countries with a large planting area include Indonesia, Thailand, Malaysia, Vietnam, China, India, Nigeria, Brazil, Sri Lanka and Libya. The natural rubber output in Thailand, Indonesia and Malaysia accounts for about 67% of total world output. Since 2000, the natural rubber planting industry has developed rapidly in Vietnam, the Philippines and Myanmar, and the growth rate of rubber planting area and output has been higher than that of the world. These regions become emerging natural rubber producing countries.

**3.2 Effect of ITRC policy on natural rubber prices** In early 2016, the International Tripartite Rubber Council composed of Thailand, Indonesia and Malaysia agreed to implement Agreed Export Tonnage Scheme (AETS), leading to significant rise of the world's natural rubber prices, and the policy of producers played an important role. The joint export restriction imposed by major international rubber producing countries appeared twice in history, which caused significant increase in the rubber prices. The rubber prices soared when the major rubber producing countries limited the rubber export for the first time. In December 2008, due to the continuous fall of natural rubber prices, the International Rubber Consortium announced that rubber export volume would be curtailed by 0.915 million t from 2009. Subsequently, the natural rubber spot prices continued to rise over the span of a year, with the maximum rise of 147%. In 2012, the natural rubber export was limited for the second time and the natural rubber prices rose against the tendency. In August 2012, due to the severe natural rubber stocks, three major rubber producing countries decided to cut rubber export volume by 0.3 million t from October 1, and then the natural rubber spot prices continued to rise for more than five months, with the maximum increase of 25%.

**3.3 World's natural rubber supply and demand trends** International Rubber Study Group (IRSG) forecasts that the world's rubber supply will fall short of demand by 2020. Thailand is the world's largest producer and exporter of rubber, and the rubber planting area is 3.09 million ha. In 2016, the tapping area was 2.83 million ha and tapping rate was 91%. In 2016, the natural rubber output was 4.5 million t. Indonesia has the world's largest rubber planting area (3.64 million ha). In 2016, the tapping area was 3.03 million ha and tapping rate was 83%. Vietnam's natural rubber production reached 1.05 million t in 2016, but Vietnam's domestic rubber consumption is less than 0.2 million t per year. In 2016, Malaysia's natural rubber production reached 0.69 million t, and Malaysia supplies almost 80% of latex gloves in the world, requiring a lot of latex, and it imports at least 0.5 million t natural rubber latex from Thailand to process gloves every year. India's natural rubber production was 0.563 million t during 2015–2016, and India needs to import rubber. According to the data derived from IRSG, the average annual growth rate of natural rubber consumption is expected to reach 2.8% during 2016–2025, and the world's natural rubber consumption is expected to reach 12.78 million t in 2017, an increase of 2.2%. The world's natural rubber supply is expected to be abundant during 2017–2025, which can meet downstream demand.

### 4 Strategies

#### 4.1 Focusing on the development of Class I rubber production area

The regions suitable for planting natural rubber are divided into three rubber production areas. In Class I rubber production area, the average temperature is higher than 22 °C, the monthly average temperature  $\geq 18$  °C lasts not less than 9 months, and the annual rainfall is greater than 1500 mm. The average wind speed is less than 2.0 m/s, the probability of average temperature  $\leq 10$  °C in rainy days is not more than 3.3%, and the probability

of typhoons with level of higher than 12 is 0. Under normal management, the annual dry rubber yield in rubber plantation is more than 6.7 kg per ha, and the area of available land for rubber planting is 0.2 million ha in this area. In Class II rubber production area, the average temperature is 21–22 °C, the monthly average temperature  $\geq 18$  °C lasts not less than 9 months, and the probability of average temperature  $\leq 10$  °C in rainy days is 3.4%–6.6%. The probability of typhoons with level of higher than 12 is not more than 3.3%. Under normal management, the annual dry rubber yield in rubber plantation is more than 5.36 kg per ha, and the area of available land for rubber planting is 0.3 million ha in this area. In Class III rubber production area, the average temperature is lower than 21 °C, the monthly average temperature  $\geq 18$  °C lasts less than 9 months, and the annual rainfall is about 1200 mm. The average wind speed can be greater than 3 m/s, but the probability of typhoons with level of higher than 12 is not more than 6.6%. Under the normal management, the annual dry rubber yield in rubber plantation is more than 4 kg per ha. In view of natural conditions for rubber planting as well as production costs, China's natural rubber production focuses on the development of Class I rubber production area, enhancement of Class II rubber production area and adjustment of Class III rubber production area.

**4.2 Building high-yielding rubber plantation** Xishuangbanna is the best area for rubber planting in China, and enjoys a tropical monsoon climate. The combination of water and heat conditions is good in the region. Due to high soil fertility and low rate of natural disasters, the rubber trees grow fast and in the rubber plantation with normal management, the tapping standards can be reached 6–7 years after planting. In 1993, the dry rubber output of Xishuangbanna reclamation system exceeded 100 kg, 38.2 kg higher than in Hainan and 67.64 kg, 32.97 kg and 31.4 kg higher than in Indonesia, Thailand and Malaysia, respectively. In 1996, Xishuangbanna reclamation system also created a record average dry rubber yield of 8.3 kg per ha, and the average rubber yield was 5.9 kg per plant. It is suggested that the high-yielding natural rubber plantations should be developed in Class I rubber production area so as to give full play to the advantages of rubber planting in Xishuangbanna. There is also a need to make full use of Xishuangbanna's superior natural environment and China's new tapping system and scientific fertilization techniques to develop and consolidate China's high-yielding natural rubber areas.

**4.3 Establishing high-quality rubber production base** At present, the natural rubber produced in China can not meet the high standards, the domestic rubber performance is poor, and the natural rubber produced can not be used as rubber for military aviation. Therefore, in Class II rubber production area, it is necessary to choose the rubber farms with good conditions to build high-quality rubber production base as the special production base of rubber raw materials for military aviation. The establishment of high-quality rubber production base requires the supporting management and production measures. (i) Establishing contiguous organic rubber plantation. It is necessary to make a good overall plan of organic rubber plantation and choose the areas with good

eco-environment for rubber planting, high soil organic matter content and rich sources of organic fertilizer to establish continuous organic rubber plantation. (ii) Building the high-quality rubber processing plant. The composition of latex as the main raw material for initial rubber processing is greatly affected by a variety of natural factors<sup>[2]</sup>. The processing plant construction plan is in accordance with the technical requirements of military aviation rubber production to choose the production technology, advanced processing equipment and high precision testing instruments. (iii) Developing the management measures for rubber planting. It is necessary to avoid the use of chemical fertilizers and herbicides during rubber planting and rubber tree management. (iv) Selecting excellent tapping workers for tapping. The excellent workers can realize scientific tapping and keep the fresh rubber solution from going bad during tapping. (v) It is necessary to tap in strict accordance with the tapping technical requirements featured by "management, maintenance and tapping" and avoid the use of ethephon and other stimulants.

#### 4.4 Expanding rubber production belt in Southeast Asia

China's natural rubber technology has reached the world's advanced level in terms of rubber cultivation, timber use and tapping, and the natural rubber industry's international competitiveness continues to increase. The basic construction technology of natural rubber plantation, improved variety breeding technology, pest control and tapping technology have reached the international level, and the processing equipments are also launched into the international market. The primary natural rubber products have certain competitiveness in the international market, and the quality of SCR5 and natural latex concentrate has reached the advanced level. China's natural rubber industry has a strong competitive advantage<sup>[3]</sup>. China's natural rubber production technology has the ability to expand the rubber production belt in Southeast Asia. It is necessary to actively "go out", develop natural rubber industry in Southeast Asian countries, and establish natural rubber production base, in order to control more natural rubber resources and make up for the gap in China's natural rubber supply and demand. By expanding the rubber production belt in Southeast Asia, it aims to produce more natural rubber for the country. At the same time, the "One Belt, One Road" policy will help to strengthen the long-term partnership between China and Southeast Asian countries, develop natural rubber industry and promote the competitive natural rubber resource development in partner countries to meet the partner countries' demand for China's rubber production technology and achieve joint development of natural rubber industry.

#### References

- [1] YE L, LI YP, LIU YQ, *et al.* Analysis on current development situation and countermeasure of natural rubber industry[J]. *Guangdong Agricultural Sciences*, 2014(4): 68–73. (in Chinese).
- [2] LI YF, PAN JR. Domestic natural rubber raw technical situation and development suggestions[J]. *China Tropical Agriculture*, 2015(4): 47–51. (in Chinese).
- [3] ZHANG SL, GUO JC. Analysis of the comparative advantage of China's natural rubber production[J]. *Problems of Forestry Economics*, 2010, 30(3): 193–198. (in Chinese).