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# Study on Natural Rubber Development in Thailand

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**Abstract** This paper firstly introduced the development prospects of natural rubber in Thailand, discussed the general situation of rubber tree planting in Thailand, and analyzed the natural rubber harvested area, per unit area yield, yield and natural rubber exports in Thailand. The results showed that the annual average natural rubber harvested area in Thailand increased by 1.21% from 1980 to 1990; the annual natural rubber harvested area increased by 4.27% from 1991 to 2011; the annual average natural rubber harvested area in 2012–2016 increased by 5.65% per year; from 1980 to 2004, the per unit area yield of natural rubber in Thailand showed a rising trend, and rubber yield from 2005 to 2016 showed a decline trend; from 1980 to 2016, Thailand's natural rubber yield showed a wave-like rise. In recent years, natural rubber production has changed little. In 2015, the yield fell by 2.19% compared with 2014, and in 2016 it increased by 0.22% compared with 2015; from 1981 to 2016, the export volume of natural rubber in Thailand basically showed a trend of rising with large fluctuation. In recent years, the export volume of natural rubber in Thailand accounted for 74%–82% of natural rubber yield in that year. Finally, it is found that the harvested area of natural rubber in Thailand will continue to decline in the next few years, it is difficult to increase the yield, the proportion of natural rubber exports and yield will gradually decline.

**Key words** Natural rubber, Area, Per unit area yield, Yield, Export

## 1 Introduction

Natural rubber is obtained by solidifying and drying the latex which is discharged when the rubber tree is tapped. The growth of rubber trees requires strict climatic conditions. The climatic conditions of Thailand are suitable for the production of rubber trees and the production of natural rubber. According to the study of Zuo Ming, most areas of Thailand have a tropical monsoon climate. The coastal plain has a tropical rainforest climate. The year is divided into hot season (March to May), rainy season (June to October) and cool season (November to February). The monthly average temperature is 22–28°C, it is the hottest in April, and the average annual precipitation is 1 000–2 000 mm<sup>[1]</sup>. The rubber planting industry in Thailand originated in the late 19th century. In 1899, the Thai–Chinese Xu Xinmei first introduced rubber seedlings from Malaysia and began trials in Trang in southern Thailand. After the 1990s, Thailand became the world's largest producer and exporter of natural rubber. Now, rubber is an important economic crop in Thailand. Natural rubber exports bring huge benefits to the Thailand every year.

## 2 Analysis of Thailand rubber planting

**2.1 Overview of rubber tree planting** After the introduction of rubber trees in Thailand at the end of the 19th century, the planting area is still small because its economic value has not been widely recognized. In 1934–1941, the demand for rubber caused by the World War II increased sharply. The rubber planting industry in Thailand entered a stage of rapid development, and the planting area rapidly expanded to 480 000 ha. In 1950–1952, the outbreak of

the Korean War once again triggered soaring of rubber prices. At this stage, the rubber planting area in Thailand expanded to 640 000 ha. In 1978–1991, Thailand's rubber tree ploughing program was funded by the World Bank, and its yield increased rapidly. In 1991, it reached 1.34 million t, ranking first in the world.

Traditional rubber planting areas of Thailand are mainly distributed in southern and central areas. In recent ten years, they are gradually expanded to northern and northeastern areas. In 76 provinces of the whole country, 52 provinces have planting of rubber trees, and the top five provinces that produce rubber are Suratthani, Songkhla, Trang, Nakhon Si Thammarat and Amphoe Mueang. Rubber output of these five provinces accounts for more than 50% of the total rubber output in Thailand<sup>[11]</sup>. According to the study of Wang Yu *et al.*<sup>[2]</sup>, rubber planting is concentrated in the southern Malay Peninsula (the rubber plantation accounts for 90% of the Thailand) and the southeastern part of the Chanthaburi region. At present, the relatively dry northeast plateau region has also started to plant rubber trees. In Thailand, about six million people are engaged in production, processing, and trade of natural rubber, accounting for 1/10 of the whole population of Thailand.

In Thailand, the rubber planting is mainly small rubber plantation, and the rubber planting area of individual small rubber plantation accounts for more than 90%. According to the study of Li Rong *et al.*<sup>[3]</sup>, farmers in Thailand generally own 2–3 ha of land which are fully privatized<sup>[3]</sup>. In 2002, the rubber planting area in Thailand reached 2 million ha, and the rubber plantation was distributed mainly in southern Thailand (about 89%), about 8.5% was distributed in northeastern Thailand and about 2.5% in northern Thailand. In 2006, Thailand's rubber planting area was 2.29 million ha, of which the southern region was the largest, planting 1.75 million ha, accounted for 76.4% of the total rubber planting area in Thailand, the central rubber planting area accoun-

ted for 11.5%, the northeast rubber planting area accounted for 10.7%, and the northern rubber planting area accounted for 1.4%. In 2006, the rubber tapping area in Thailand was 1.74 million ha, 85.2% in southern regions, 10.5% in central regions, 4.2% in northeastern regions, and 0.1% in northern regions. In 2014, Thailand's rubber planting area was 2.89 million ha, accounting for about 5.6% of the total land area of Thailand. According to data from the Ministry of Agriculture and Cooperatives of Thailand, by 2016, Thailand's rubber planting area has reached 3.6 million ha.

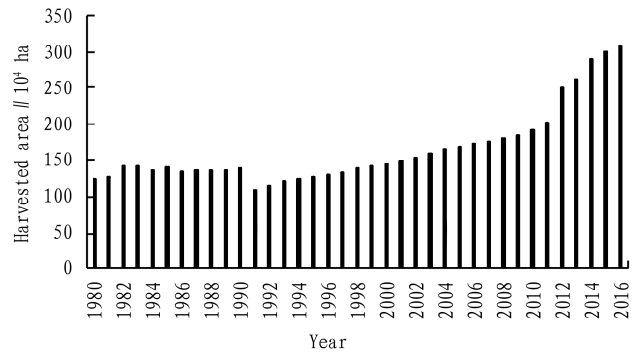
Thailand's natural rubber production in 2006 was 3.09 million t, of which the southern region was 2.66 million t, accounting for 86.08% of the country's total yield; the central region was 0.31 million t, accounting for 10.03% of the country's total yield; the northeast region was 0.12 million t, accounting for 3.88% of the country's total yield, and the northern region was 2 708 t, accounting for 0.01% of the total yield. In 2016, the rubber yield of southern regions accounted for 70%, the northeastern regions accounted for 18.6%, the central regions accounted for 8.8%, and the northern regions accounted for 2.6%, the northeastern and northern regions had significant increase in both the rubber planting area and the yield. From January to November 2017, the total yield of natural rubber in Thailand was 3.98 million t, and it was estimated that the total yield of natural rubber in Thailand in 2017 would be 4.45 million t.

**2.2 Natural rubber harvested area** The rubber planting area in Thailand ranks second in the world, second only to Indonesia. In 2016, the natural rubber harvested area of Thailand accounted for 26.99% of the world natural rubber harvested area. According to the statistics of the Food and Agriculture Organization of the United Nations, the natural rubber harvested area in Thailand was 0.4 million ha in 1961, 0.81 million ha in 1970, 1.24 million ha in 1980, 1.4 million ha in 1990, 1.46 million ha in 2000, 1.93 million ha in 2010, and 3.09 million ha in 2016. From Fig. 1, it can be seen that the natural rubber harvested area in Thailand changed little from 1980 to 1990, showed a little fluctuation. In 1990, it increased by 12.10% compared with 1980, with an average annual increase of 1.21%. From 1991 to 2011, the natural rubber harvested area increased year by year. In 2011, it increased by 85.45% compared with 1991, with an average annual growth rate of 4.27%. The natural rubber harvested area from 2012 to 2016 increased more significantly. In 2016, it increased by 22.62% compared with 2012, with an average annual growth of 5.65%.

### 3 Analysis on natural rubber yield in Thailand

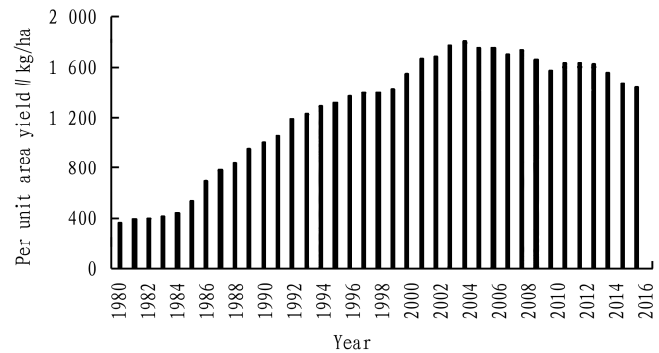
**3.1 Per unit area yield of natural rubber** In 2016, the average per unit area yield of natural rubber in the world was 1 149 kg/ha, which was 25.94% lower than that in Thailand. According to the statistics of the Food and Agriculture Organization of the United Nations, per unit area yield of natural rubber in Thailand was 465 kg/ha in 1961, 354 kg/ha in 1970, 375 kg/ha in 1980, 1 013 kg/ha in 1990, 1 559 kg/ha in 2000, 1 582 kg/ha in 2010,

and 1447 kg/ha in 2016. From Fig. 2, it can be seen that the yield of natural rubber in Thailand showed an increasing trend from 1980 to 2004. The highest rubber yield was 1 816 kg/ha in 2004, and the lowest rubber yield was 375 kg/ha in 1980. The rubber yield increased by 384.80% in 2004 compared with in 1980. From 2005 to 2016, the per unit area yield of rubber showed a decline trend, it declined by 17.88% in 2016 compared with in 2005.



Data source: FAOSTAT.

**Fig. 1** Natural rubber harvested area in Thailand from 1980 to 2016

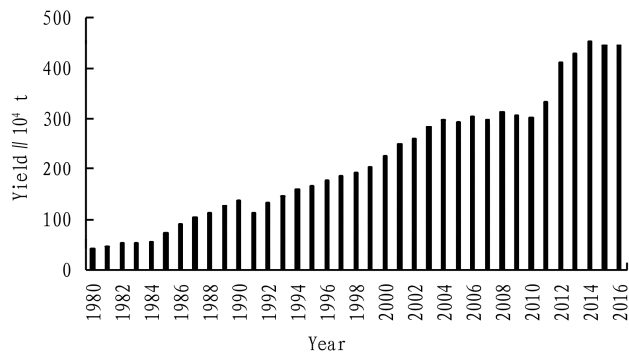


Data source: FAOSTAT.

**Fig. 2** Per unit area yield of natural rubber in Thailand from 1980 to 2016

**3.2 Natural rubber yield** In 2016, the world's natural rubber yield was 13.15 million t. Thailand's natural rubber yield accounted for 34.07% of the world's natural rubber yield. It is estimated that Thailand's natural rubber yield in 2017 would be 4.46 million t. According to the statistics of the Food and Agriculture Organization of the United Nations, Thailand's natural rubber yield was 0.19 million t in 1961, 0.29 million t in 1970, 0.47 million t in 1980, 1.42 million t in 1990, 2.28 million t in 2000, 3.05 million t in 2010, 4.48 million t in 2016. From Fig. 3, it can be seen that from 1980 to 2016, Thailand's natural rubber yield showed a wave-like rise, it reached the highest 4.57 million t in 2014. Natural rubber yield increased by 178.72% in 1989 compared with in 1980, and increased by 44.37% in 1999 compared with in 1990, increased by 35.53% in 2009 compared with in 2000, and increased by 46.89% in 2016 compared with in 2010. In recent years, natural rubber yield increased by 23.58% in 2012 compared with 2011, increased by 4.11% in 2013 compared

with in 2012, increased by 6.03% in 2014 compared with in 2013, decreased by 2.19% in 2015 compared with in 2014, and increased by 0.22% in 2016 compared with in 2015.

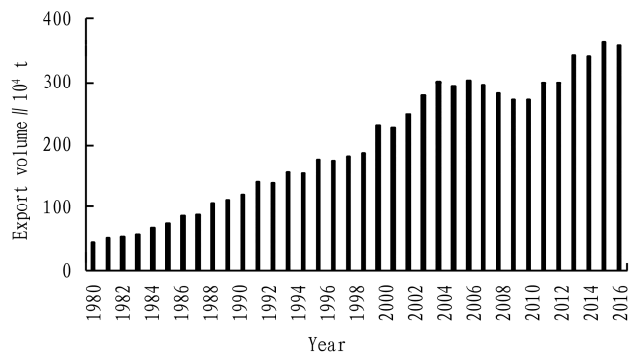


Data source: FAOSTAT.

**Fig. 3** Natural rubber yield in Thailand from 1980 to 2016

#### 4 Analysis on natural rubber export of Thailand

Thailand is the world's largest exporter of natural rubber. Its main export products are ribbed smoked sheets (about 57%), standard rubber (about 27%), and latex (about 12%). The products are mainly exported to China, Japan, Malaysia, the United States and the European Union, and China has become the largest importer of natural rubber of Thailand. According to the statistics of the Food and Agriculture Organization of the United Nations, the export volume of natural rubber of Thailand was 0.47 million t in 1981, accounting for 92.16% of the natural rubber yield in that year; the export volume was 1.13 million t in 1990, accounting for 79.58% of the natural rubber yield in that year; the export volume was 2.73 million t in 2010, accounting for 89.51% of the natural rubber yield in that year; the export volume was 3.60 million t in 2016, accounting for 80.36% of natural rubber yield in that year; the export volume was 2.33 million t in 2000, which was higher than 2.28 million t in that year. From Fig. 4, it can be seen that the export volume of natural rubber of Thailand basically showed a trend of rising with large fluctuation from 1981 to 2016. The largest export volume of natural rubber was 3.65 million t in 2015, accounting for 81.66% of natural rubber yield in that year.



Data source: FAOSTAT.

**Fig. 4** Natural rubber export volume of Thailand from 1981 to 2016

### 5 Conclusions and discussions

#### 5.1 Constant shrinkage of natural rubber harvested area

The price of natural rubber in Thailand has gradually increased

from 3.29 yuan/kg (16 baht/kg) in 1991 to a historical record of 35.85 yuan/kg (174.44 baht/kg), which has promoted the enthusiasm of farmers to plant rubber, especially in 2006. In 2011, the new rubber planting area increased significantly. The largest export volume of natural rubber was 3.65 million t in 2015, accounting for 81.66% of natural rubber yield in that year. The natural rubber harvested area has been increasing year by year from 1991 to 2016, and it has been increasing rapidly especially from 2012 to 2016, because it takes six years for rubber trees to enter the rubber production stage. Natural rubber prices have gradually declined since February 2011 and are still in a downturn. The new rubber trees planted before 2011 have entered the tapping period in recent years, and the rubber harvested area would reach the maximum in recent years. In addition, in July 2018, Thai Deputy Prime Minister Somkid Jatusripitak pointed out at the senior meeting of the Ministry of Agriculture of Thailand that in the next five years, Thailand will annually reduce the rubber planting area 200 000 rai (32 000 ha), and if those who live in areas suitable for rubber tree growing cut down their rubber trees, they will obtain the corresponding subsidy from the Thai government. Therefore, it is estimated that the natural rubber planting area in Thailand will show a negative growth in 2018, and the natural rubber harvested area will continue to shrink.

**5.2 Natural rubber yield close to the peak value** From 2005 to 2016, the per unit area yield of rubber showed a decline trend, it annually declined by 1.63% in this period. The natural rubber yield was the highest at 4.57 million t in 2014, dropping by 2.19% in 2015 compared with in 2014, and dropping by 1.97% in 2016 compared with in 2014. In Thailand, the new rubber planting area reached 0.267, 0.29, and 0.165 million ha in 2010, 2011 and 2012, respectively. These will realize the theoretical annual yield of the new cutting area at 0.400 5, 0.435 and 0.232 5 million t in 2017, 2018 and 2019, respectively. Because of the decline of rubber price, the rubber planting area shrank year by year, and it was only 4 600 ha in 2017. With the decline in rubber prices and the downturn, the management level of rubber gardens has declined, and the increase in rubber garden abandonment will affect the yield of natural rubber. In July 2018, the Thai government encouraged rubber growers to cut down rubber trees, and rubber growers will obtain a subsidy of 20 000 yuan if cutting 1 ha of rubber trees. Therefore, reducing the rubber planting area and increasing the abandonment of rubber gardens will reduce the yield of natural rubber. It is estimated that the yield of natural rubber in Thailand will get close to its peak and it is difficult to increase significantly in the next few years.

**5.3 Gradually decline in the proportion of natural rubber exports and yield** Since 1991, Thailand has become the world's largest producer and exporter of natural rubber. Thailand's natural rubber exports accounted for 79.81% of natural rubber yield in 2013, 74.62% in 2014, 81.66% in 2015 and 80.36% in 2016. The proportion of natural rubber consumption and yield in Thailand has remained at around 10% until 2006, and it has gradually increased to 12% - 13% in 2007. Thailand has been encouraging natural rubber consumption, providing relevant preferential policies, encouraging the development of downstream enterprises, and

establishing rubber industrial parks such as LK Rubber Industrial City Hub (LK-RICH) and Changwat Songkhla natural rubber industrial parks, which promoted the centralized development of the natural rubber industry, the domestic natural rubber consumption is on the rise. Last year, the Thai government proposed increasing the domestic consumption from 0.6–0.8 million t to 1.0 million t. In summary, from the perspective of natural rubber consumption trends in Thailand, the proportion of both natural rubber exports and yield will gradually decline.

(From page 5)

the WTO, China-Arab States Cooperation Forum, and Forum on China-Africa Cooperation, to strengthen the regular consultation between the governments, actively communicate and understand each other's demands, and jointly formulate a mid-term and long-term anti-poverty cooperation road map, and bring into play a good guiding role of the government. (ii) It is recommended to actively absorb the third-party organizational forces, to lay a solid foundation for anti-poverty cooperation. China and the West African North African government should take an open and welcoming attitude to actively absorb various social organizations to participate in various undertakings that benefit the people's livelihood, public services, humanities exchanges, and medical assistance. Besides, both sides should strengthen cooperation with international agencies such as the World Bank, the World Health Organization (WHO), the United Nations Development Programme (UNDP), and United Nations International Children's Emergency Fund (UNICEF) to raise the anti-poverty efficiency. (iii) It is recommended to encourage and support China's large enterprises to actively "go global", find honest partners in West Asia and North Africa, firstly select safe areas, accelerate the development of underdeveloped areas, realize organic combination of enterprise development with national demands through the establishment of industrial parks and investment in large-scale projects, and stimulate endogenous motivation of the poverty-stricken areas in West Asia and North Africa on the basis of the development of the enterprises themselves, so as to get rid of poverty.

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