



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Research on Development of Natural Rubber in Indonesia

Huide HUANG, Haolun HUANG*

Institute of Scientific and Technical Information, Chinese Academy of Tropical Agricultural Sciences, Haikou 571101, China

Abstract Through analyzing the harvested area, yield and total production of natural rubber and the exports of dry rubber, the situation of rubber cultivation in Indonesia was studied, and the development prospects of natural rubber in Indonesia were explored. The results showed that the harvested area of natural rubber in Indonesia showed a wave-like rise from 1980 to 2016. The area harvested in 2000 was increased by 47.06% compared with that in 1980, and the area harvested in 2016 was increased by 6.43% compared with that in 2008. The yield of natural rubber in Indonesia showed a dynamic trend from 1980 to 2016. It reached the maximum (993 kg/ha) in 2007 and reached the minimum (575 kg/ha) in 1982. The total production of natural rubber in Indonesia showed a wave-like rise during 1980–2016. The total production of natural rubber in 2000 was increased by 47.06% compared with that in 1980, and the total production of natural rubber in 2016 was increased by 110.67% compared with that in 2000. The export volume of dry natural rubber in Indonesia basically showed a concussive rise from 1980 to 2016. The proportion of export volume in the total production in 2016 declined by 14.75% compared with that in 1980. It is believed that the harvested area of natural rubber in Indonesia will be near the peak in the next few years, and it is difficult to increase the output; the proportion of exported natural rubber in the total production will decline slowly; and the potential for natural rubber development is large.

Key words Rubber, Area, Yield, Output, Export

1 Introduction

Natural rubber is produced from rubber trees, which are native to the Brazilian Amazon. The British H. A. Wickham introduced rubber seeds from Brazil to the Kew Gardens in the UK in 1876, and then rubber trees were shipped to Sri Lanka, Malaysia, Indonesia and other places for planting. Yang Lianzhen reported that Indonesia established the first rubber plantation in western Java in 1903^[1]. Indonesia is located on both sides of the equator and belongs to a tropical maritime climate, with average temperature of about 25°C, small monthly temperature difference and abundant rainfall. The climatic conditions of high temperature and abundant rainfall are very conducive to plant growth. Hou Fengxia reported that Indonesia was the second largest producer of natural rubber in the world, and its natural rubber planting area ranked first in the world, with great development potential^[2].

2 Analysis on cultivation of natural rubber in Indonesia

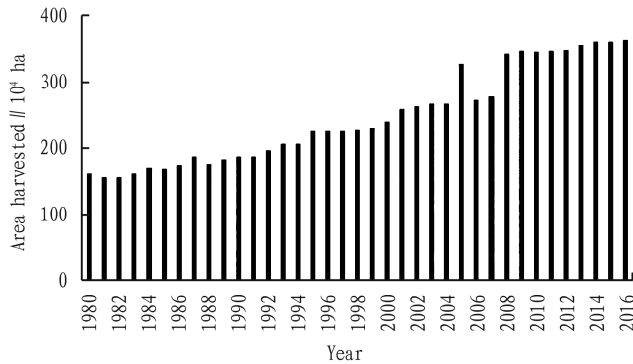
2.1 Overview of rubber tree cultivation The natural rubber planting areas in Indonesia are mainly distributed in Sumatra and Kalimantan. The rubber planting area of Sumatra accounts for about 75% of the total area, mainly distributed in the North Sumatra centered on Medan. The production of natural rubber in the North Sumatra accounts for about 30% of the total production in Sumatra, and the production of natural rubber in the South Sumatra centered on Palembang accounts for about 35% of Sumatra's production. The planting area of rubber in Kalimantan Island accounts for about 20% of the total area, mainly distributed in Pontianak and Banjarmasin. In addition, Padang and Riau Province in West Sumatra are also the main producing areas.

The natural rubber plantations in Indonesia are owned by the state, privates and small farmers. Among them, the plantations owned by small farmers dominate. In the late 1990s, due to the high profit of palm oil, many rubber plantations and small farms had replanted oil palm trees, resulting in a decline in natural rubber planting area. Since 2002, when rubber prices have risen, many farmers who had been forced to replant other crops because of their hard life have come back to replanting rubber and rehabilitating the original old rubber plantations, and many large and small farmers have been also attracted to expand the rubber planting area. By 2006, the proportions of rubber plantations of different ownerships were as follows: small farmer-owned plantations 84.5%, state-owned plantations 7.2% and private plantations 8.3%. When the price of natural rubber fell, the small rubber plantation owners were forced to leave the rubber plantations and find another livelihood. As a result, the small rubber plantations were neglected and abandoned, resulting in lower production of natural rubber in Indonesia. Despite the low production of natural rubber in Indonesia, the proportion of natural rubber production in Indonesia to the world's total production increased from 21.16% in 2000 to 24.01% in 2016.

2.2 Harvested area of natural rubber The planting area of rubber in Indonesia ranks first in the world. In 2016, the harvested area of natural rubber in Indonesia accounted for 31.80% of the world's total. According to the statistics of the Food and Agriculture Organization of the United Nations, the harvested area of natural rubber in Indonesia was 1.35 million ha in 1961, 1.39 million ha in 1970, 1.61 million ha in 1980, 1.87 million ha in 1990, 2.40 million ha in 2000, 3.45 million ha in 2010, and 3.64 million ha in 2016. The dynamics of harvested area of natural rubber during 1980–2016 were shown in Fig. 1.

As shown in Fig. 1, Indonesia's natural rubber harvested area

showed a wave-like upward trend from 1980 to 2016. The harvested area of natural rubber was increased by 47.06% in 2000 compared to 1980, increased by 110.67% in 2016 compared to 2000, increased by 23.02% in 2008 compared to 2007, and increased by 6.43% in 2016 compared to 2008, with an average annual growth rate of 0.80%.



Note: Data source: FAOSTAT.

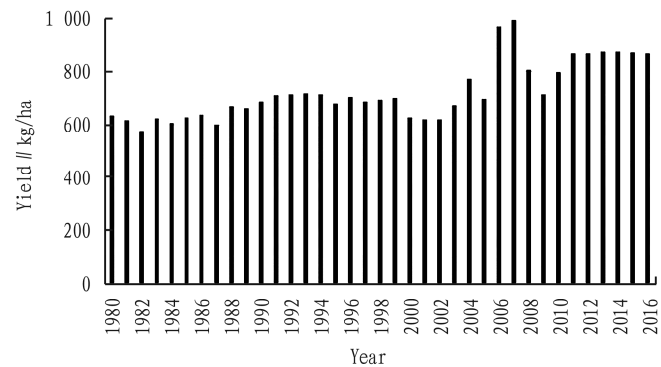
Fig. 1 Harvested area of natural rubber in Indonesia during 1980–2016

3 Analysis on production of natural rubber in Indonesia

3.1 Yield of natural rubber Indonesia is the world's largest natural rubber harvesting country. However, due to the dominance by small farmers' rubber plantations and private rubber plantations, the yield is lower. In 2016, the average yield of natural rubber in the world was 1 149 kg/ha, and that in Indonesia was 868 kg/ha, 24.46% lower than the world's average. According to the statistics of the Food and Agriculture Organization of the United Nations, Indonesia's natural rubber yield was 512 kg/ha in 1961, 577 kg/ha in 1970, 633 kg/ha in 1980, 684 kg/ha in 1990, 626 kg/ha in 2000, 794 kg/ha in 2010, and 868 kg/ha in 2016. The dynamics of yield of natural rubber in Indonesia from 1980 to 2016 were shown in Fig. 2. As shown in Fig. 2, the yield of natural rubber in Indonesia fluctuated from 1980 to 2016. The yield of natural rubber was highest (993 kg/ha) in 2007 and was lowest (575 kg/ha) in 1982. The yield of natural rubber in 2016 was increased by 36.97% compared with that of 1980. During 2011–2016, the yield of natural rubber did not change much. The yield of natural rubber was reduced by 0.001% in 2012 compared to 2011, increased by 1.08% in 2013 compared to 2012, increased by 0.001% in 2014 compared to 2013, reduced by 0.66% in 2015 compared to 2014, and reduced by 0.10% in 2016 compared to 2015.

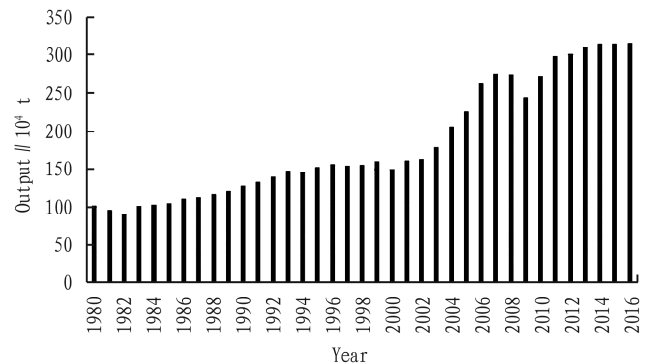
3.2 Output of natural rubber in Indonesia Indonesia's natural rubber production comes from small farmers' plantations, state-owned plantations and private plantations. The output of the small farmers' rubber plantations, state-owned rubber plantations and private rubber plantations accounts for about 80%, 10% and 10% of the total output, respectively. Indonesia's natural rubber production ranks second in the world. In 2016, the output of natural rubber in Indonesia accounted for 24.03% of the world's total. According to the statistics of the Food and Agriculture Organiza-

tion of the United Nations, Indonesia's natural rubber production was 0.69 million t in 1961, 0.80 million t in 1970, 1.02 million t in 1980, 1.28 million t in 1990, 1.50 million t in 2000, 2.73 million t in 2010, and 3.16 million t in 2016. The dynamics of output of natural rubber in Indonesia from 1980 to 2016 were shown in Fig. 3. As shown in Fig. 3, Indonesia's output of natural rubber showed a wave-like rise from 1980 to 2016. It was increased by 47.06% in 2000 compared to 1980, increased by 110.67% in 2016 compared to 2000, increased by 84.00% in 2007 compared to 2000, and increased by 22.54% in 2011 compared to 2009. The increase became slow from 2011 to 2016. Indonesia's natural rubber output was increased by 0.67% in 2012 compared to 2011, increased by 3.32% in 2013 compared to 2012, increased by 1.29% in 2014 compared to 2013, kept equivalent between 2015 and 2014, and increased by 0.32% in 2016 compared to 2015.



Note: Data source: FAOSTAT.

Fig. 2 Yield of natural rubber in Indonesia from 1980 to 2016



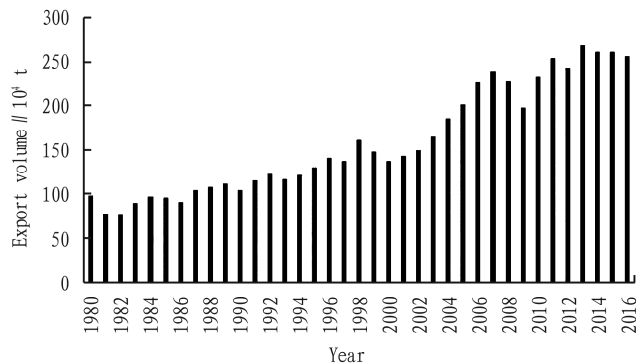
Note: Data source: FAOSTAT.

Fig. 3 Output of natural rubber in Indonesia from 1980 to 2016

4 Analysis on exports of natural rubber from Indonesia

Indonesia is the second largest exporter of natural rubber in the world. In 2016, Indonesia's dry rubber exports accounted for 31.72% of the world's total dry rubber exports. Ma Weide reported that Indonesia's natural rubber is mainly exported to the countries and regions such as the United States, Japan, China, Singapore and South Korea^[3]. According to the statistics of the Food and Agriculture Organization of the United Nations, the export volume of dry natural rubber from Indonesia was 0.66 million t in 1961 (accounting for 95.65% of the natural rubber production of the year), 0.77 million t in 1970 (accounting for 96.25% of

the natural rubber production of the year), 0.98 million t in 1980 (accounting for 96.08% of the natural rubber production of the year), 1.05 million t in 1990 (accounting for 82.03% of the natural rubber production of the year), 1.37 million t in 2000 (accounting for 91.33% of the natural rubber production of the year), 2.34 million t in 2010 (accounting for 85.71% of the natural rubber production of the year), and 2.57 million t in 2016 (accounting for 81.33% of the natural rubber production of the year). The dynamics of export volume of dry natural rubber from Indonesia during 1980–2016 were shown in Fig. 4. As shown in Fig. 4, the export volume of dry natural rubber from Indonesia showed a concussive rise from 1980 to 2016. The minimum export volume appeared in 1982, 0.76 million t, and the maximum export volume appeared in 2013, 2.70 million t. In recent years, the proportion of exported natural rubber in the total production has decreased, 86.81% in 2013, 83.17% in 2014, 83.17% in 2015, and 81.33% in 2016. Compared with that in 1980, the proportion of exported natural rubber in the total production in 2016 was reduced by 14.75 percentage points.



Note: Data source: FAOSTAT.

Fig. 4 Export volume of natural rubber from Indonesia during 1980–2016

5 Conclusions and discussions

5.1 The harvested area of natural rubber has been near the peak

After the price of natural rubber reached a peak of 5 000 USD/t in July 2011, it showed a trend of sharp decline and small fluctuations. In 2008–2016, the harvested area of natural rubber in Indonesia increased slowly, with an average growth of less than 1%. In 2010, the price of natural rubber was a record high, so the enthusiasm for planting in the rubber producing countries was high in 2010, 2011 and 2012. In recent years, the price of natural rubber has been in a downturn, affecting the enthusiasm of rubber farmers, so the newly-increased planting area of rubber trees has been decreasing year by year. Indonesia's natural rubber harvested area is speculated to be near peak. If the price of natural rubber continues to be low, the natural rubber harvested area may begin to decline in the next few years.

5.2 The output of natural rubber in Indonesia is difficult to be increased greatly

In recent years, Indonesia's natural rubber production has grown at a slow rate, increased by 5.68% in 2016 compared to 2011, with an average annual growth rate of 1.14%. The area of small farmers' rubber plantations and private rubber plantations accounts for about 92% of Indonesia's total rubber planting area, and their production accounts for about 90% of Indonesia's total rubber output. However, the yield of natural rubber in small farmers' plantations and private plantations is lower. As the price of rubber has continued to fall, the newly-increased planting area of rubber has been decreasing since 2013, and many rubber plantations have been abandoned. It is speculated that Indonesia's natural rubber production will not increase significantly in the next few years.

5.3 The proportion of exported dry rubber in the total production declines slowly

Indonesia's GDP growth has been above 4.8% since 2010. Gross domestic product (GDP) increased by 5.02% in 2016, and the growth rate is expected to continue to rise to 5.1% in 2017. Indonesia has a total population of 257 million, and it is the fourth most populous country in the world. Tires and rubber gloves are the industries with the largest consumption of natural rubber. The consumption of natural rubber continues to grow, and domestic natural rubber absorption continues to rise. Plastic consumption in Indonesia exceeds the sum of Malaysia, Thailand and Singapore. Indonesia's economic growth and people's living needs will boost domestic demand for natural rubber, so the proportion of exported rubber in the total output will slowly decline.

5.4 The development potential of natural rubber is great

Indonesia has a tropical rainforest climate with high temperature, abundant rainfall, low wind and high humidity, which are especially suitable for planting rubber trees, with obvious advantages. The cultivated land area of Indonesia is about 80 million ha, and about 42 million people are engaged in agricultural production, with abundant labor, which can provide certain labor resources for the development of the rubber industry. Indonesia's natural rubber production per hectare is 200 kg lower than the world's average, so the space for yield improvement is still large. In terms of natural conditions, cultivated land resources, labor resources, rubber production resources, *etc.*, Indonesia has great potential for natural rubber development.

References

- [1] YANG LZ. Analysis on the development of Indian NR industry [J]. World Tropical Agriculture Information, 2007, 45(4): 1–6. (in Chinese).
- [2] HOU FX. A review of investing Indian NR industry's current situation [J]. China Rubber, 2006, 23(18): 24–25. (in Chinese).
- [3] MA WD. Survey on NR from Indonesia [J]. China Rubber, 2005, 22(4): 14–15. (in Chinese).