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# Development of Oil Palm Industry in Indonesia

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**Abstract** Indonesia began to grow oil palm in small scale in 1911. In 2006, palm oil production ranked first in the world. In 2007, the oil palm harvested area ranked first in the world. In 2009, the output of oil palm fruit ranked first in the world. To further explore the development prospects of the oil palm industry in Indonesia, the development of the oil palm industry in Indonesia is discussed, and the oil palm harvested area and yield and palm oil production in Indonesia are analyzed in this paper. The results showed that the oil palm harvested area in Indonesia showed an increasing trend from 1980 to 2016. During the period from 1980 to 1993, the oil palm harvested area was slowly increasing. In 2002–2016, the oil palm harvested area was growing rapidly, and the oil palm harvested area was 9.33 million ha in 2016. The growth trend of the oil palm fruit production was obvious in 2008–2016, and the oil palm fruit yield was 161.4 million t in 2016. The palm oil production increased slowly from 1980 to 1999. During the period 2000–2014, the palm oil production increased by a large margin. In 2014, the palm oil production was 29.28 million t. It is believed that the area of oil palm in Indonesia will continue to expand, and there is a development space of at least 1 500 000 to 2 000 000 ha. The oil palm fruit production and palm oil production in Indonesia will continue to increase in the coming years. Indonesia has unique advantages for the development of oil palm industry, with great potential for development.

**Key words** Oil palm, Harvested area, Yield, Palm oil, Analysis

## 1 Introduction

Oil palm is native to tropical Africa and is now distributed in the tropics between 13° N and 12° S<sup>[1]</sup>. Oil palm is a typical tropical perennial crop that is adapted to high temperature and humidity. It starts to grow only when the daily average temperature is above 18°C, and the temperature range of 22–27°C is most preferable. Oil palm is extremely sensitive to low temperature. When the temperature drops below 10°C, it will be damaged. The precipitation is required to be more than 1 500 mm. According to FAO statistics, oil palm is grown in more than 40 countries around the world, mainly in Malaysia and Indonesia in Asia, western and central Africa, northern South America and Central America<sup>[2]</sup>. Oil palm trees were first planted in West Africa and Equatorial Africa. In 1848, the Dutch first introduced to Indonesia<sup>[3]</sup>. Indonesia crosses the equator and belongs to the tropical rain forest climate. The climate changes slightly throughout the year. The average temperature is 25–27°C. It is divided into rainy season and dry season, instead of spring, summer, autumn and winter. The rainy season is generally from November to April of the following year, and the dry season is from May to October. The rainfall in Indonesia is very abundant, and the annual average is between 1 600–2 200 mm. The wind is not big. There are few storms. There is no typhoon. The air humidity is large. The natural climate is suitable for growth of oil palm. Indonesia has been a major palm oil producer in the world for many years. At present, the oil palm industry has become an important part of Indonesia's economic development.

## 2 Overview of development of oil palm industry

Oil palm was introduced in 1848 from the Botanical Garden of Mau-

ritius and Amsterdam, Netherlands to the Bogor Botanical Garden in Java, Indonesia. After 1860, test sites were developed on both Java and Sumatra. But in the long years, oil palm was only used as an ornamental plant and a street tree and had not been productively cultivated. Until 1911, the first batch of oil palm plantations built by the colonists in Sumatra and the Kuala Selangor in the Malay Peninsula appeared, but their scale was very small. Between 1936 and 1939, the total area of oil palm in Southeast Asia was only 120 000 ha.

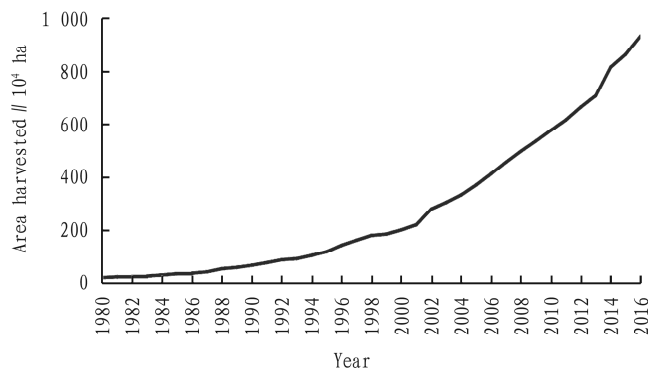
Indonesia is the world's largest oil palm planting country. In 2006, its palm oil production exceeded that of Malaysia. In 2007, its oil palm harvested area exceeded that of Malaysia. In 2009, its oil palm fruit production exceeded that of Malaysia. The main oil palm production area in Indonesia is Sumatra. The planting area and production of oil palm in Sumatra account for about 80% of the totals in Indonesia, including North Sumatra, West Sumatra, Riau Province, South Sumatra, Bengkulu, Lampung, Jambi, Aceh and Bangka Belitung. Other producing areas include Kalimantan (East Kalimantan, South Kalimantan, Central Kalimantan, West Kalimantan), West Java, South Sulawesi, Central Sulawesi, Southeast Sulawesi and Papua. Among the oil palm plantations in Indonesia, about 45% of them are owned by self-employed farmers. About 1.6 million self-employed farmers are engaged in oil palm planting. Farmers own land, and they provide oil palm planting products to larger planting companies. There are many oil palm planting companies and palm oil producers in Indonesia, and the well-known ones are Sinar Mas Group, PT Perkebunan Minanga Ogan, RGM International, and so on. Among them, the Sinar Mas Group is one of the largest oil palm growers, one of the largest palm oil refiners and one of the largest oil chemicals manufacturers, and it has the world's largest palm oil refinery. The above-mentioned groups and companies have mas-

tered most of the palm oil market in Indonesia and have provided a large amount of palm oil to Indonesia and countries around the world.

### 3 Dynamics of harvested area and production of oil palm

**3.1 Dynamic of harvested area of oil palm** The oil palm production in Indonesia is very concentrated, and the oil palm forest is mainly distributed in Sumatra. The equator traverses the central part of Sumatra, and the typical tropical rainforest climate is suitable for the rapid growth of oil palm trees. Therefore, oil palm planting near the equator is well developed. The oil palm harvested area (oil palm fruit, area harvested) in Indonesia was 70 000 ha in 1961, 100 000 ha in 1970, 200 000 ha in 1980, 670 000 ha in 1990, 2 010 000 ha in 2000, 5 780 000 ha in 2010 and 9 330 000 ha in 2016. In 2017, the harvested area of oil palm was about 9 500 000 ha. During 1961–1970, the oil palm harvested area was increased by an average of 3 000 ha per year; during 1970–1980, the oil palm harvested area was increased by 10 000 ha per year; the harvested area in 1989 was increased by 390 000 ha compared with that in 1980, with an average annual increase of 39 000 ha; the harvested area of oil palm in 1999 was increased by 1 180 000 ha compared with that in 1990, and the average annual increase was 118 000 ha; the harvested area in 2009 was increased by 3 360 000 ha compared with that in 2000, with an average annual increase of 336 000 ha; and the harvested area in 2016 was increased by 3 550 000 ha compared with that in 2010, and the average annual increase was 507 000 ha (Fig. 1).

As shown in Fig. 1, the harvested area of oil palm in Indonesia showed an increasing trend from 1980 to 2016. During 1980 and 1993, the harvested area of oil palm increased slowly; and during 2002 and 2016, the harvested area of oil palm increased rapidly. The harvested area of oil palm in Indonesia increased slightly from 1980 to 1989, increased greatly from 1990 to 1999, increased more greatly from 2000 to 2009, and increased most greatly from 2010 to 2016.



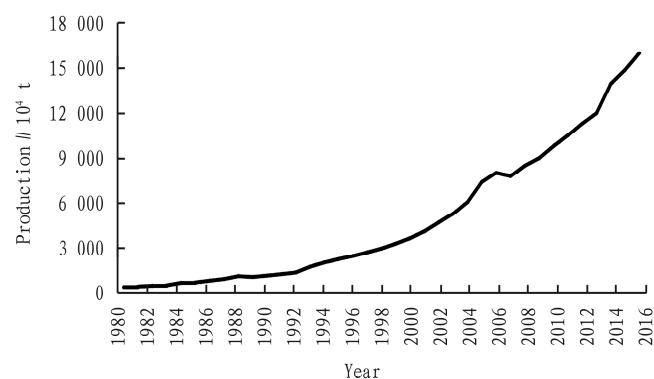
Note: Data source: FAOSTAT.

**Fig. 1** Dynamic of harvested area of oil palm in Indonesia from 1980 to 2016

**3.2 Dynamic of production of oil palm** Oil palm in Indonesia is mostly distributed in Sumatra in the west. Sumatra is the

first region in the world to carry out commercial cultivation of oil palm. Due to unique climatic conditions and abundant land resources, oil palm production in Sumatra has been developed rapidly. Since the 1970s, the Indonesian government has opened many new oil palm plantations in Sumatra, increasing the production of palm oil. On the northeast side of the island, oil palm planting belts of hundreds of miles are formed. Among them, the volcanic hills and plains centered on Medan in the northwest are most concentrated. According to the statistics of the Food and Agriculture Organization of the United Nations, the production of oil palm fruit in Indonesia was 940 000 t in 1961, 1 300 000 t in 1970, 3 400 000 t in 1980, 11 150 000 t in 1990, 36 380 000 t in 2000, 97 800 000 t in 2010, and 160 140 000 t in 2016 (Fig. 2).

As shown in Fig. 2, the production of oil palm fruit in Indonesia had basically increased from 1980 to 2016, and the increasing trend was more obvious during 2008 and 2016.

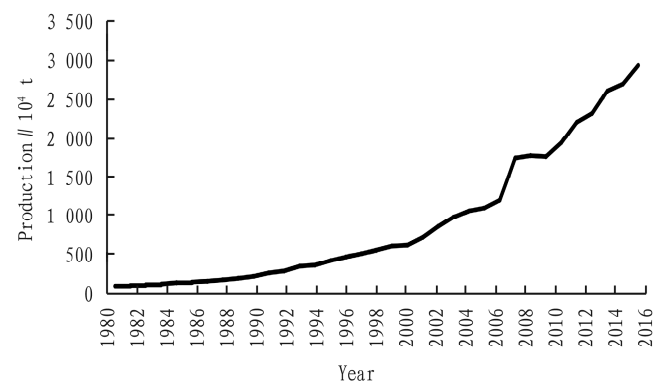


Note: Data source: FAOSTAT.

**Fig. 2** Dynamic of production of oil palm fruit in Indonesia from 1980 to 2016

### 4 Dynamic of production of palm oil

Oil palm is a perennial tropical woody oil crop with an economic life of 20–40 years. Adult oil palm trees can grow fruit all the year round and be harvested continuously. The oil contents of the pulp and kernel are both about 50%. According to the statistics of the Food and Agriculture Organization of the United Nations, the production of palm oil in Indonesia was 150 000 t in 1961,



Note: Data source: FAOSTAT.

**Fig. 3** Dynamic of production of palm oil in Indonesia from 1980 to 2016

220 000 t in 1970, 720 000 t in 1980, 2 410 000 t in 1990, 7 000 000 t in 2000, 21 960 000 t in 2010 and 29 280 000 t in 2014. According to the data from the Indonesia Palm Oil Association (Gapki), the production of palm oil in Indonesia was 35 500 000 t in 2015, 34 500 000 t in 2016 and 38 170 000 t in 2017.

As shown in Fig. 3, the production of palm oil in Indonesia had shown an upward trend from 1980 to 2014. During 1980 – 1999, the production of palm oil increased slowly; and during 2000 – 2014, the production of palm oil increased significantly.

## 5 Conclusions and discussions

### 5.1 The harvested area of oil palm will continue to increase

Indonesia has abundant cultivated land resources, and the area of land that can be used for planting oil palm is about 11 000 000 – 13 000 000 ha. In 2007, Indonesia's oil palm harvested area began to rank first in the world, reaching 4 560 000 ha. After that, the harvested oil of oil palm has continued to increase. The harvested area of oil palm was increased by 9.2% in 2008 compared to 2007, increased by 7.8% in 2009 compared to 2008, increased by 7.6% in 2010 compared to 2009, increased by 6.7% in 2011 compared to 2010, increased by 7.8% in 2012 compared to 2011, increased by 6.5% in 2013 compared to 2012, increased by 15.1% in 2014 compared to 2013, increased by 5.9% in 2015 compared to 2014, and increased by 8.1% in 2016 compared to 2015. It indicates that in the past ten years, the oil palm harvested area in Indonesia had been increasing, with a year-on-year increase of more than 5.9%. It is estimated that Indonesia's oil palm harvested area will continue to expand in the next few years, with a development space of at least 1 500 000 – 2 000 000 ha.

### 5.2 The production of oil palm fruit and palm oil will continue to increase

Indonesia is a large oil palm planting country. In 2009, Indonesia's oil palm fruit production began to rank first in the world, reaching 90 million t. After that, the annual output of oil palm fruit has continued to increase. The output of oil palm fruit was increased by 8.7% in 2010 compared to 2009, increased by 7.4% in 2011 compared to 2010, increased by 7.6% in 2012 compared to 2011, increased by 6.2% in 2013 compared to 2012, increased by 16.6% in 2014 compared to 2013, increased by 6.5% in 2015 compared to 2014, and increased by 7.4% in 2016 compared to 2015. Indonesia is a big palm oil producer. Since 2006, Indonesia's palm oil production began to rank first in the world, reaching 17.35 million t. The production of palm oil in In-

donesia was increased by 1.8% in 2007 compared with 2006, increased by –0.7% in 2008 compared with 2007, increased by 10.1% in 2009 compared with 2008, increased by 13.7% in 2010 compared with 2009, increased by 5.2% in 2011 compared with 2010, increased by 12.6% in 2012 compared with 2011, increased by 3.4% in 2013 compared with 2012, and increased by 8.8% in 2014 compared with 2013. In the past decade, the production of oil palm fruit and palm oil in Indonesia has been increasing. In the coming years, the production of oil palm fruit and palm oil will continue to increase.

### 5.3 The oil palm industry has great development potential

Oil palm has strict requirements on climatic conditions. Temperature and moisture determine the growth and yield of oil palm, restricting the production range of oil palm. Although oil palm planting is distributed in the areas between 20° S and 20° N with altitude below 300 m, the main producing areas are concentrated in the tropical rain forest between 10° S and 10° N and in the tropical monsoon forest area at the edge, with altitude below 300 m. Indonesia has typical tropical rainforest climate, with high temperature, abundant rainfall, high humidity, small annual temperature range, weak wind, and no distinct seasons, which provide good natural conditions for oil palm planting and production. Indonesia has unique advantages for development of oil palm industry.

The area of cultivated land in Indonesia is larger than that of Malaysia, Nigeria and other major oil palm-producing countries. The area of cultivated land in Indonesia is about 80 million ha, and there is more cultivated land to grow oil palm. Indonesia has agricultural population of approximately 42 million, which can provide certain labor resources for the development of the oil palm industry. Therefore, from the aspects of climate, natural conditions, cultivated land resources and labor resources, it can be concluded that the oil palm industry in Indonesia has great development potential.

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