Development Suggestion of Apple Industry in China under the New Situation

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Basic Orientation of Apple Industry in China
1. Apple has achieved sufficient supply

In 2017, Apple area harvested in China was 2.22 million ha, production was 41.39 million ton, respectively accounts for 53.6 percent and 59.34 percent of total area harvested and production in the world.
## Top 10 Provinces of apple area harvested and production in China in 2017

<table>
<thead>
<tr>
<th>Province</th>
<th>Area harvested (thousand ha)</th>
<th>Production (10 thousand ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaanxi</td>
<td>586.2</td>
<td>1092.5</td>
</tr>
<tr>
<td>Shandong</td>
<td>265.4</td>
<td>939.5</td>
</tr>
<tr>
<td>Gansu</td>
<td>230.3</td>
<td>444.9</td>
</tr>
<tr>
<td>Shanxi</td>
<td>152.1</td>
<td>434.5</td>
</tr>
<tr>
<td>Henan</td>
<td>147.4</td>
<td>311.1</td>
</tr>
<tr>
<td>Liaoning</td>
<td>140.0</td>
<td>240.9</td>
</tr>
<tr>
<td>Hebei</td>
<td>122.2</td>
<td>228.1</td>
</tr>
<tr>
<td>Xinjiang</td>
<td>71.7</td>
<td>144.2</td>
</tr>
<tr>
<td>Yunnan</td>
<td>70.7</td>
<td>65.2</td>
</tr>
<tr>
<td>Sichuan</td>
<td>36.6</td>
<td>59.7</td>
</tr>
</tbody>
</table>
China population is equivalent to 18.41% of the total world population, Less than one-fifth.

With 50% of the world's apples to supply 18% of the world's population, which has achieved sufficient supply.
According to the National Bureau of Statistics, between 2006 and 2017, China’s apparent consumption of apples (yield + imports - exports) increased from 25.12 million tons to 43.5 million tons, with an increase of 70% during 11 years. The total consumption has reached more than half of the total consumption of the world, becoming the world's largest consumer of apples.

In 2017, apple consumption per capita in China amounted to 31.4 kg/year.
Fuji apple is the main variety in China, its production accounts for 72 percent of total apple production.
The planted area of early-mid maturing varieties was less than 15 percent, the price of imported apple, boutique apple and special apple is getting higher and higher.
Rockit apple, the Perfect Snack for a Fit Lifestyle!

- Crunchy, sweet, and delicious taste
- Grown to be the perfect snack size
- Innovative and convenient packaging and brand design
- Stable shelf life – remains fresh longer
- Presents an opportunity to capture healthy snacking
- POS available
Small core and thick flesh

Innovative and convenient packaging
In 2017, the apple import volume of China was 68,000 tons and the import value was 110 million US dollars. The main importers are the United States, New Zealand and Chile. The unit price per kilogram is about 11.55 yuan.
Apple cultivation mode has moved from the traditional production mode to modern cultivation mode.
There are three reasons:

（1）The labor force is aging

There was 314.22 million agricultural production and management personnel in 2016. The number of labor force ages 55 and older is projected to 105.51 million, which represented 33.57 percent of the labor force. The persons ages 60 and above constituted 18.42 percent of the labor force. By 2020, the number of persons ages 60 and above constituted 18.42 percent of the labor force. By 2020, the number of persons ages 60 and above will rise to 24.8 percent, By 2030, aging labors will make up 33.8 percent.

The aging labor force has become an important bottleneck for replacing old growth drivers with new ones, because the aging labor accept new mode, technologies and knowledge updates slowly.
(2) Small-scale farm

There were 226 million famer with under 1.65 acres land in 2013, accounting for more than 85.96% of the total number of household contractors.

The main farmer were small-scale operations based on households. It will take a long time to transform into large-scale modern production.

The apple orchards in China were only 0.6-0.8 acres. The contradiction between modern mechanization production and small-scale operation is difficult to solve.
(3) Higher establishment cost of modern cultivation mode orchard

For example, establishing a dwarfing self-rooted apple orchard with in-row spacing of 1.5m and between-row spacing of 4m. The total cost was RMB 15,000 yuan per Mu, including seedlings, anchor poles, inline poles, wire, staples, tighteners, crimps, fertigation equipment, fertilizer, pesticide, floor cover and labor costs. In three years before cropping, the total cost will be RMB 25,000 to 30,000 yuan per Mu, including the management cost in three years such as bending, pruning, spraying, fertilizing and so on.
4. The consumer market has changed dramatically

Comparison of per capita disposable income of urban and rural residents in China from 2010 to 2016

(1) Consumer spending increased greatly

Urban and rural per capita disposable income reached 33,616 yuan and 12,363 yuan in 2016, compared with a 76 percent and 108 percent increase in 2010.
(2) Consumer groups changed greatly

The middle class in China has rapidly expanded. The middle class in China is a group of people with an annual income of 75,000 to 280,000. This population has grown from 5 million in 2000 to 225 million today, and is expected to increase to 275 million by 2020.

Chinas per capita GDP in 2018 was about $9777, from $1,000 in 2001 to nearly $10,000 in 2019.
（3）The consumer attitudes changed hugely

The proportion of millennials consumer was 30.6 percent, Nielsen Media Research has defined millennials as between 21 and 37 years old in 2018.

Focus on fashion and individuality. Choosing What I Like, enjoying the feeling of pleasure and achievement during consumption processes.

Deficit spending habit. who spending exceeds revenue over a particular period of time. Person who lives from paycheck to paycheck or from payday to payday.

Care about Brands. Millennials want to buy from brands that speak to their values.

Millennials are a huge and important potential market due to their strong purchase power and deficit spending attitude.
Chinese luxury shoppers account for over $500 billion yuan ($73 billion) in annual spending, representing almost a third of the global luxury market.

Millennials are generally defined as being born from the early 1980s up to the year 2000.
New situation and main problems in China's apple industry
1. National related policies has produced new demands on the apple industry

(1) Ecological civilization construction and environmental supervision

In the past five years, the central environmental protection inspector has played a huge role in the continuous improvement of environmental data. The central environmental protection inspector has achieved full coverage of 31 provinces (municipalities and autonomous regions). As of now, 40,706 environmental problems reported by the supervision group have been basically completed, with a total of 10,806 cases and a fine of 547.59 million yuan. 335 cases and 424 persons detained; About 4,855 people, and the responsibility for 6,471 people.

1194 villas in Qinling Mountains had been renovated.
In China, the total production of nitrogen, phosphorus, and potassium was 58.92 million tons in 2017. Among them, the output of nitrogen fertilizer is 37.95 million tons. Chinese farmers use an average of 531.9 kilograms of chemical fertilizer per hectare per year – more than 3.9 times the global average. The Nutrient use efficiency was 30-35%. The problem of soil acidification is serious in the apple producing areas of Bohai Bay.

In December 2018, around 207,000 metric tons of chemical pesticides had been produced in China. It was down 8.7% year-on-year with 83,000 tons of imported pesticides, 1.632 million tons of pesticides exported. The pesticide utilization rate was 38.8%.

The pesticides consumption of apple orchard was 141 thousand tons every year in China.
The agricultural source ammonia emission intensity averages 943.2 kilograms per square kilometer in China. The North China region is the highest agricultural source ammonia emission intensity in China. The Henan and Shandong provinces are more than 5 tons per square kilometer, and Hebei and Tianjin are around 4 tons per square kilometer.
(2) Eliminate poverty by 2020

It is a hard task that must be completed that 30 million people who the entire impoverished rural population living below current poverty standards will be lifted out of poverty by 2020.

More than 1 million people in Yan'an City are engaged in the apple industry, accounting for 45% of the total population. The annual per capita fruit industry income is more than 5,000 yuan. The poverty alleviation model of the characteristic industry with apples has become a national promotion experience.
The 19th National Congress of the Communist Part of China (CPC) put forward a rural vitalization strategy, aiming to achieve five major goals, which are industrial prosperity, ecological livability, civilized rural lifestyle, effective governance, and prosperous life, and accelerating the modernization of agriculture and rural areas.

Apple is the forerunner industry for poverty alleviation in poverty-stricken areas, and the dominant industry for structural adjustment in developed regions.
Agricultural supply-side structural reform

optimizing the products and industrial structure, improving the quality and efficiency of supply; Pursuing green manufacturing methods, enhancing the sustainable development of agriculture; expand new industries and new businesses, expanding the value chain of agricultural industry; strengthening the drive of scientific and technological innovation, leading the development of modern agriculture; strengthening areas of weakness of agriculture and rural short-board, consolidating the basis of rural shared development; increasing rural reform efforts, activating the endogenous development momentum of agriculture and rural areas.
Apple industry should contribute to poverty alleviation
Apple industry should contribute to rural revitalization strategy
Apple industry faces an objective need to shift from high-speed growth to high-quality growth
Small apples, big industries, great pressure, and wide prospects!

Socialism with Chinese characteristics has entered a new era. The principle contradiction facing Chinese society has evolved to be that between unbalanced and inadequate development and the people’s ever-growing needs for a better life.

People's yearning for a good and beautiful life is the goal for us to strive for.
2. Industry problems remain unresolved, industrial quality is still not high

(1) Variety ratio and structure are not reasonable enough

Main planting variety is too single, Fuji occupies over 72% in total areas and yield, Rolls accounts for 4%. Other varieties with a production exceeding 1.0% of the total output are Red delicious, Qinguan, Gala, Golden delicious, Huaguan, Jonagold, Jinhong and Hanfu.

There are about 330 varieties bred by China, but their production only accounts for 10%;

There are too many late-maturing varieties, and there are few early and medium-maturing varieties.

Shandong

Shaanxi
（2）Poor quality of Seedlings, lack of virus seedlings

The planting density of traditional seedlings is 666.7 per ha, and the proportion of virus-free seedlings is less than 2%.

Varieties and rootstocks are confusing and the propagation system is imperfect.
**Apple seedling standard in Italy**

**Knip trees, 2 years old**
- **Shoots**: 8+ early shoots
- **Height**: at least 170 cm
- **Arborisation**: AA (= very good arborisation)

**Knip trees, 2 years old**
- **Shoots**: 5-7 early shoots
- **Height**: at least 170 cm
- **Arborisation**: A (= good arborisation)

**1 year old trees**
- **Shoots**: 8+ useable shoots
- **Height**: at least 165 cm
- **Arborisation**: AA (= very good arborisation)

**1 year old trees**
- **Shoots**: 5+ early shoots
- **Height**: at least 165 cm
- **Arborisation**: A (= good arborisation)

**Trunk diameter**: at least 20 mm (measured 10 cm above the grafting)

**Garnished**: to at least 70 cm from the ground
- **Wood**: mature
- **Packaging**: nets

**Storage**: specialist storage in our own cooling cells
- **Root growth**: sufficient
- **Labelling**: Maxi Knip labels
# 苗木等级

## 海升苹果苗木等级

<table>
<thead>
<tr>
<th>苗木类型</th>
<th>等级</th>
<th>分枝数/个</th>
<th>高度/cm</th>
<th>径粗/mm</th>
<th>侧根数量/条</th>
</tr>
</thead>
<tbody>
<tr>
<td>矮化自根砧大苗</td>
<td>AAA</td>
<td>≥5</td>
<td>≥160(蜜脆140)</td>
<td>≥10</td>
<td>≥6</td>
</tr>
<tr>
<td></td>
<td>AA</td>
<td>&lt;5</td>
<td>≥140(蜜脆120)</td>
<td>≥10</td>
<td>≥6</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>0(单干苗)</td>
<td>≥120(蜜脆100)</td>
<td>≥8</td>
<td></td>
</tr>
</tbody>
</table>

## 图例

- **AA级**: 侧枝数量：小于5
- **A级**: 侧枝数量：0（单干苗）
- **蜜脆**: 70cm

### 测量指标

1. **苗木高度**
   - 其他品种平均1.6m;蜜脆1.4m

2. **侧枝长度**
   - 其他品种平均25cm及以上
   - 蜜脆15cm及以上

3. **有效侧枝数量**
   - 5个及以上
Apple tree nursery from China National Tree seed Corporation and Salver Agriculture
(3) Planting system is backward

Over 90% in total production areas are vigorous stock, tree crown is tall and big, orchards management difficult, not suitable for automated manufacturing.

Planting area of dwarfing rootstocks apple trees is 220 thousand ha, which accounts for 10% of total apple area.
(4) Flower and fruit management techniques are complicated

99% of the orchards is still thinning flower and fruits by hand, the labor cost per acre of these process is RMB 1000-1200 yuan. The proportion of fruit bagging is very high, almost 100% in Shandong and over 90% in Shaanxi Province. Other provinces is between 55% and 85%. The cost of fruit bag, the labor cost of bagging and bag picking are 780 RMB yuan, 780 yuan, 390 yuan, accounting for about 40% of the total investment in the orchard.
（5）The management of water and nutrients applied flood irrigation and empirical fertilization

Most orchards applied flood irrigation. The proportion of Water-saving irrigation orchard is less than 13%. Orchard fertilization mainly applied empirical fertilization, and the fertilizer utilization rate is very low. The utilization rate of nitrogen fertilizer is 30%-35%, the phosphate fertilizer is 10%-30%, and the potassium fertilizer is 40%-70%.
Low-level commercial processing

The apples of post-harvest commercialization account for about 8% of the total apples. Most orchards carry out grading, packaging and marketing directly in the field. Most storage enterprises do not have pre-cooling, curing, washing and grading equipment; Cold Chain system of transporting and storing is not perfect; brand awareness is not strong, and brand effects are insufficient.
① Insufficient integration of primary, secondary and tertiary industries

Most apple orchards still focus on single industry dominated by planting trees, with a low degree of integration with secondary and tertiary production. Related research, countermeasures, and targeted measures of industrial integration are very less.
(2) Less integration of the apple industry and new technologies

Apple industry in China lacks deep integration with new technologies such as Internet of Things, big data, and artificial intelligence. There are many conceptual references and few substantive contents.
Development Suggestions of Apple Industry under the New Situation
There are 25 provinces to produce apples in China. Two dominant areas, Areas around Bohai Bay and Northwest Loess plateau with planting area of 81.25%, and production of 91.35% of total China, respectively.
In 2016, Areas around Bohai Bay and Northwest Loess plateau with planting area of 28.31% and 52.94%, and production of 37.21% and 54.14% of total China, respectively.
Apple production area shifts from low altitude to higher altitude

The optimum cultivation area of apples in the Loess Plateau is 800-1200 meters altitude, and there are fewer apple orchards in the area below 800 meters altitude.

Apples in Qingyang and Pingliang of Gansu Province are mainly distributed in the area of 1300-1700 meters altitude.
High altitude or cool summer area is a characteristic development area of apple

There are 14.67 thousand ha apple orchard in Yanyuan County, Sichuan Province, mainly concentrated in the area of 2300-2500 meter altitude, with good apple quality and high production.

Zhaotong, Yunnan Province: 2280 meter altitude
Aksu Prefectura, Xinjiang: 1100 meter altitude
Tianshui Huaniu apples

There are 113.33 thousand ha apple orchards in Tianshui, the variety of 70% apple is Red Delicious.

Most orchard is located at hillside with 1000-1300 meters altitude.

"Hua Niu" Apple is famous for his brand advantages and obvious features.
Aksu sweetheart apple

Aksu is located in the southern Xinjiang region of Xinjiang, where the temperature difference is large, the light is abundant, moreover Aksu apples are annually harvested after 25 October. so that the sugar content of the apple is about eighteen degrees, the taste is particularly sweet; apple fruit kernel part sugar accumulation into a transparent shape, forming the world's unique "sugar core" Fuji apple.

*Pictures from internet*
2. Enhancing the scientific and technological innovation of the apple industry

Field crops such as corn and wheat have formed a complete industrial chain, realizing the localization of varieties and technologies, and mechanization of production process. The overall Research and development level of the apple industry is behind that of corn and wheat.
（1）Accelerate the breeding and extension of apple varieties

Breeding objectives should be based on quality breeding (high quality), characteristic breeding (size, color, flavor, function, etc.), taking into account excellent cultivation performance (resource-efficient variety selection); strengthening breeding theory and breeding technology innovation.

Strengthen cooperation in breeding, cultivation, plant protection, storage and processing, form a new supporting production technology system of new varieties, and accelerate the extension and application.
The cultivated area of the domestic variety “Hanfu” has reached more than 133.33 thousand ha. The planting districts include Liaoning, Gansu, Ningxia, Xinjiang and Shaanxi. Hanfu is the most systematic and in-depth research domestic breeding variety.
(2) Research on efficient utilization technology of light, fertilizer, water and soil

Establishing the screening and evaluation standard system of stock/scion combination suitable for different ecological regions; Study on the formation and distribution of higher photosynthetic efficiency products and regulation technology; Labor-saving tree management technology suitable for different regions.

Requirement and transportation rules of main; Interaction mechanisms and control techniques of different nutrients; Floor management techniques of orchards; Fertigation strategies for different regions and different types of orchards.
(3) Labor-saving flower and fruit management and bagless cultivation

Research on Flower bud induction, formation mechanism and regulation technology

Research and development on labor-saving thinning technology, products and equipment such as chemical and mechanical thinning

Key technologies and product development of fruit quality control under bagless cultivation conditions
（4）Scientific prevention and control of pests and diseases in orchard, mechanization and automation of plant protection

- New technologies and products research and development of major pests and diseases forecast
- Research and development of Green, low-cost, efficient physical and biological control products and technology;
- Occurrence, prevention and control technologies, product development of invasive alien species and new pests and diseases.
5. Commercial processing and brand marketing of apple

Post-harvest commercial processing technology and equipment development with Chinese characteristics

Promote brand strategy, strengthen regional and enhance the competitiveness of corporate brands

The Yantai apple with the brand value of 13.20 billion yuan ($2.06 billion) in 2018, has been the top fruit brand in China for nine consecutive years.
Label words in Jingning apple
Promoting the transformation of the apple industry from traditional production to modern cultivation mode by science and technology innovation, but it is not just a change to the dwarfing rootstock cultivation.

The connotation of modern cultivation mode should be:

Low resource intensity (fertilizer, pesticide, water, land, labor)

High mechanization lever (use machinery instead of human labor)

Sustainable and Eco-Friendly (guaranteed exiting orchard in the future)

High return on capital and labor productivity (earns money by producers and investors, being a dignity labor)
Objective:

Apple industry becomes a promising industry
Apple grower becomes an attractive occupation
Apple planting areas becomes a beautiful places to live and work

Industrial prosperity, Ecological livability
3. Encouraging the industrial capital and enterprises to invest the apple industry

Enterprises are the mainstay of market competition. Enterprises will bring forward concepts, advanced management, and abundant funds apple industry, promote the transformation of traditional apple production to modern apple production, and promote the concept of modern market to replace traditional market concepts.

Enterprises should be encouraged to invest the apple industry from land policy, tax policy, financing policy, insurance policy, social security policy, and support policy.
4. Excavating apples resources and promote the first, second and third industries integration

(1) Diversified use and development of resources
Different kinds of *Malus micromalus Makino* as Street Tree
New Zealand Rockit Apple, with an average diameter of only 5-7 cm, has been officially recognized by the UN Economic Commission for Europe as the world’s smallest, sweet-quality mini apple variety for four years. The unique and innovative tubular packaging is light and stylish, easy to carry and subversive. The concept of traditional snacks allowed Rockit to win food innovation awards in New Zealand, Australia and Germany.
High price and good market

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jinxiuhaitang</td>
<td>19.8 RMB Yuan</td>
</tr>
<tr>
<td>Longguan</td>
<td>30 RMB Yuan</td>
</tr>
<tr>
<td>Longfeng</td>
<td>19.8 RMB Yuan</td>
</tr>
<tr>
<td>Longhong</td>
<td>30 RMB Yuan</td>
</tr>
</tbody>
</table>
(2) Expanding the functions of fruit industry

Developing the traditional fruit industry into modern fruit industry that integrating of production, life and ecology. Accompanying agricultural labor, flower viewing, fruit appreciation, picking, processing, and meals, etc. to achieve the integration of the first, second and third industries.
JD intelligent stockbreeding has introduced technologies such as AI, IoT, robots, and edge computing to pig raising. NetEase started its pig farming project in 2011. Tencent are participating in a cucumber-growing to explore artificial intelligence applications in indoor farming.

In the era of the Internet of Everything, Experts, practitioners, orchards are closely linked, production and markets are closely linked, and technology and inputs are closely linked. Artificial Intelligence and internet plus industry will drive traditional industrial revolution.

What is the meaning of big data? Data collection standards? algorithm? frame? application?
6. Formulate relevant policies to support introducing wisdom, attracting talents and investment in apple industry, and absorb foreign and domestic advanced technology and management experience.

Based on international and domestic markets, promoting industrial health and sustainable development in terms of technology, management and capital.
Consumer market: understanding the changes of international and domestic market consumption

Technology market: understanding the market demand of technology users (apple growers, enterprises, etc.)

Products market: demand for products (variety, agricultural materials, etc.) users (apple growers, enterprises, consumers, etc.)

Goal: understand the market and create the market
Thanks for your attention

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