



Food and Agriculture
Organization of the
United Nations



One Country
One Priority Product

The Green Development of Special Agricultural Product - Cassava in China

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Main Content

- *Importance*
- *Comparative Advantages*
- *Demands*
- *Challenges*
- *Strategy*
- *Key Action*
- *Key Technologies*
- *Effectiveness*
- *Experience and Lessons*
- *Suggestions*



Importance

Cassava is a food security crop recommended by FAO

- World's sixth biggest grain plant
- “King of Starch” and “Underground food storehouse”
- Stable food for 1 billion people in tropical and subtropical regions
- Major cash crop for developing countries and regions
- Raw material for starch production
- Plant for bio-energy reserves

Usage of leaves: rich in protein. is food, feed of fish and pigs, silage, etc.

Usage of stems: fuel, planting material, fibrous material

Usage of tuberous roots : tapioca flour, feedstuff, starch, alcohol, etc.





2018年11月5日习主席在上海同出席首届中国国际进口博览会的外国领导人共同巡馆。



2022年4月10日习主席到海南考察崖州湾种子实验室时，强调“只有用自己的手攥紧中国种子，才能端稳中国饭碗，才能实现粮食安全。”

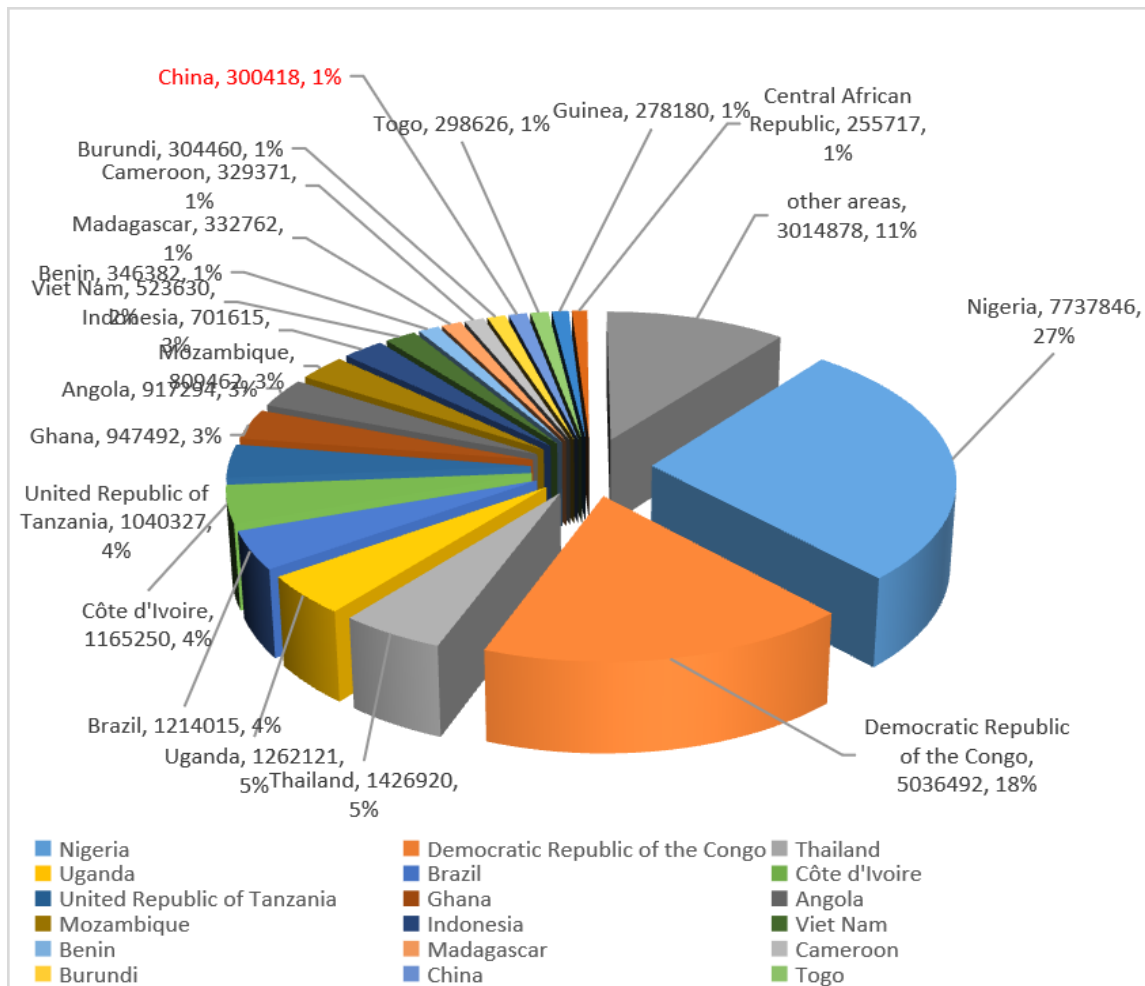


联合国千年发展8大目标之首：**消灭极端贫穷和饥饿。**

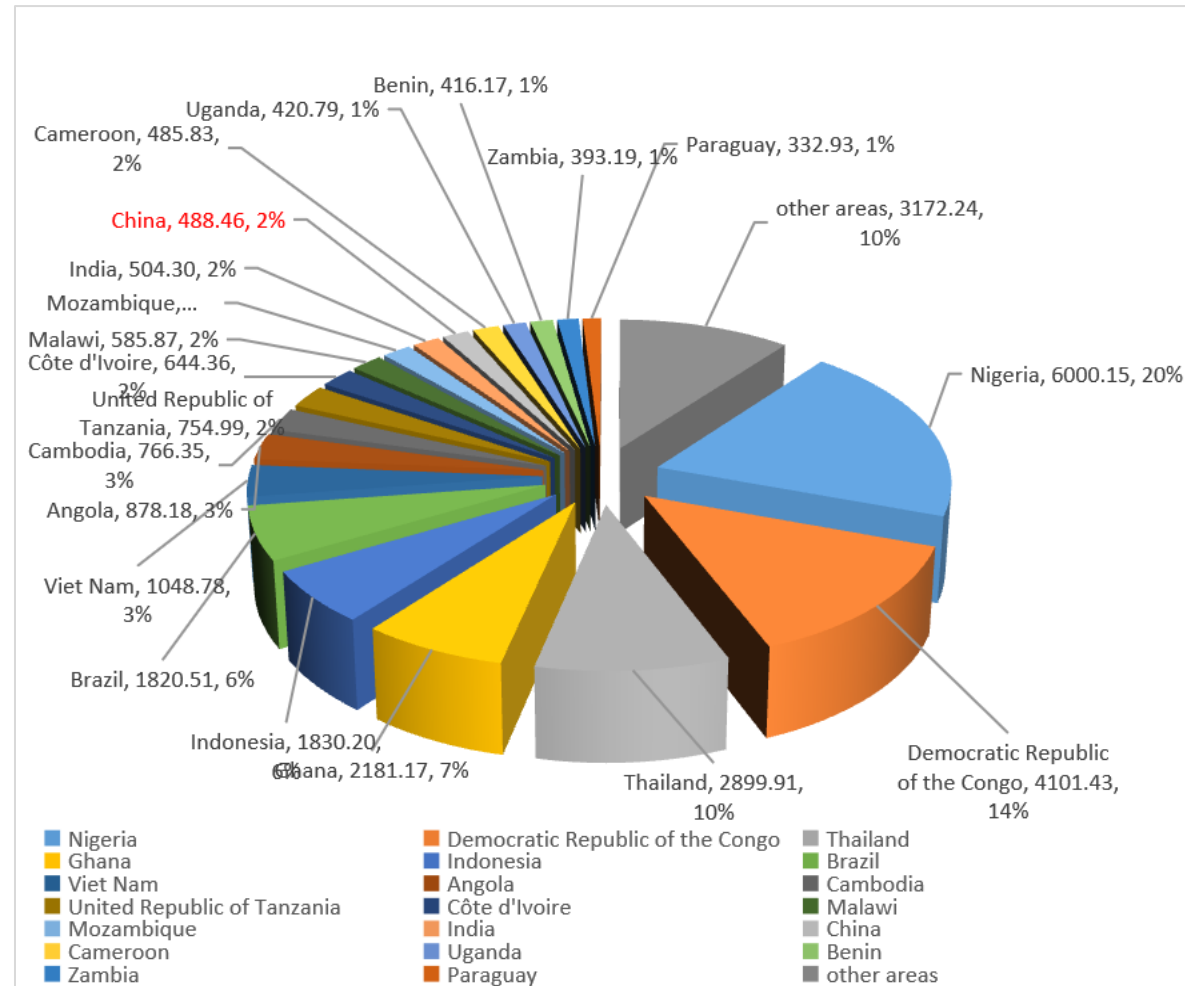


木薯粉系列特色食品128种

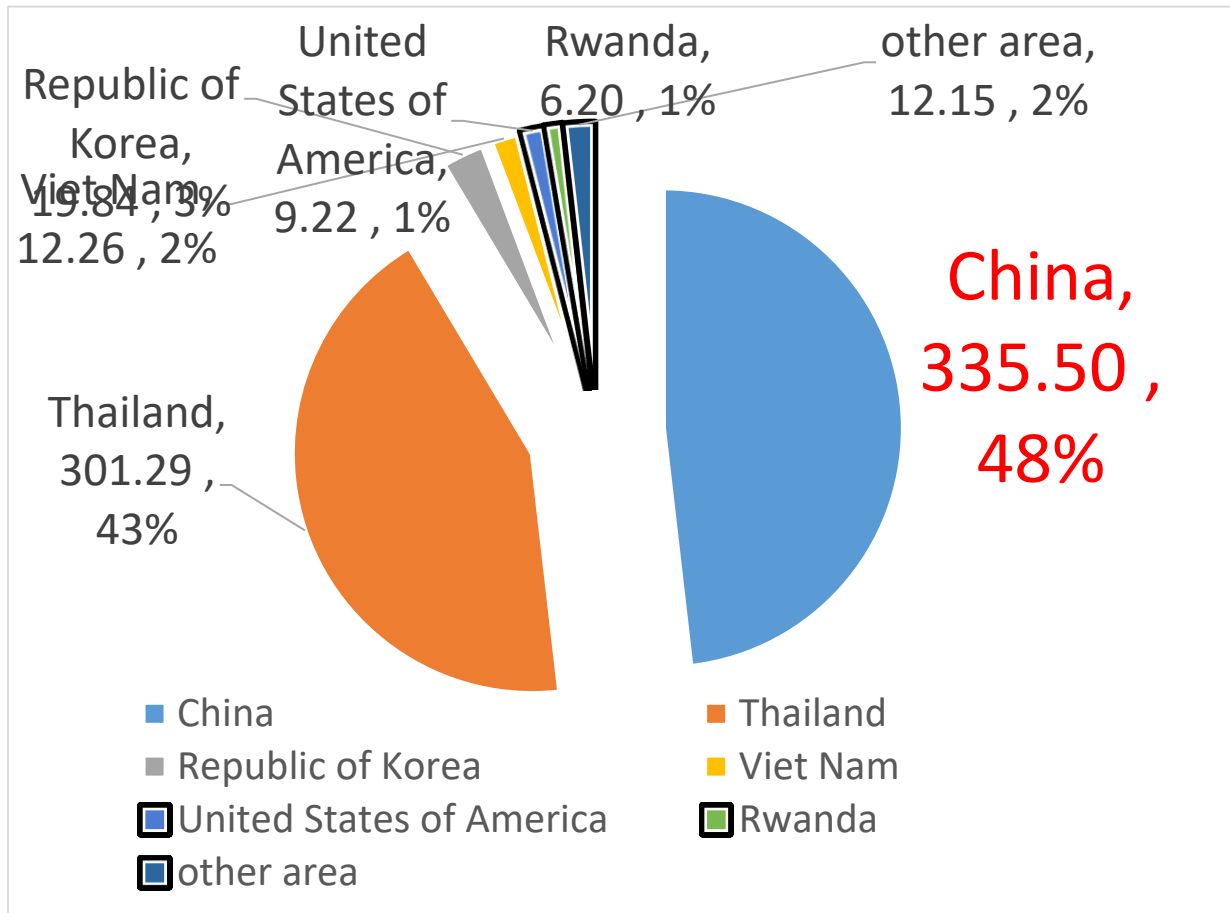
Global cassava harvest area in 2020 (ha)



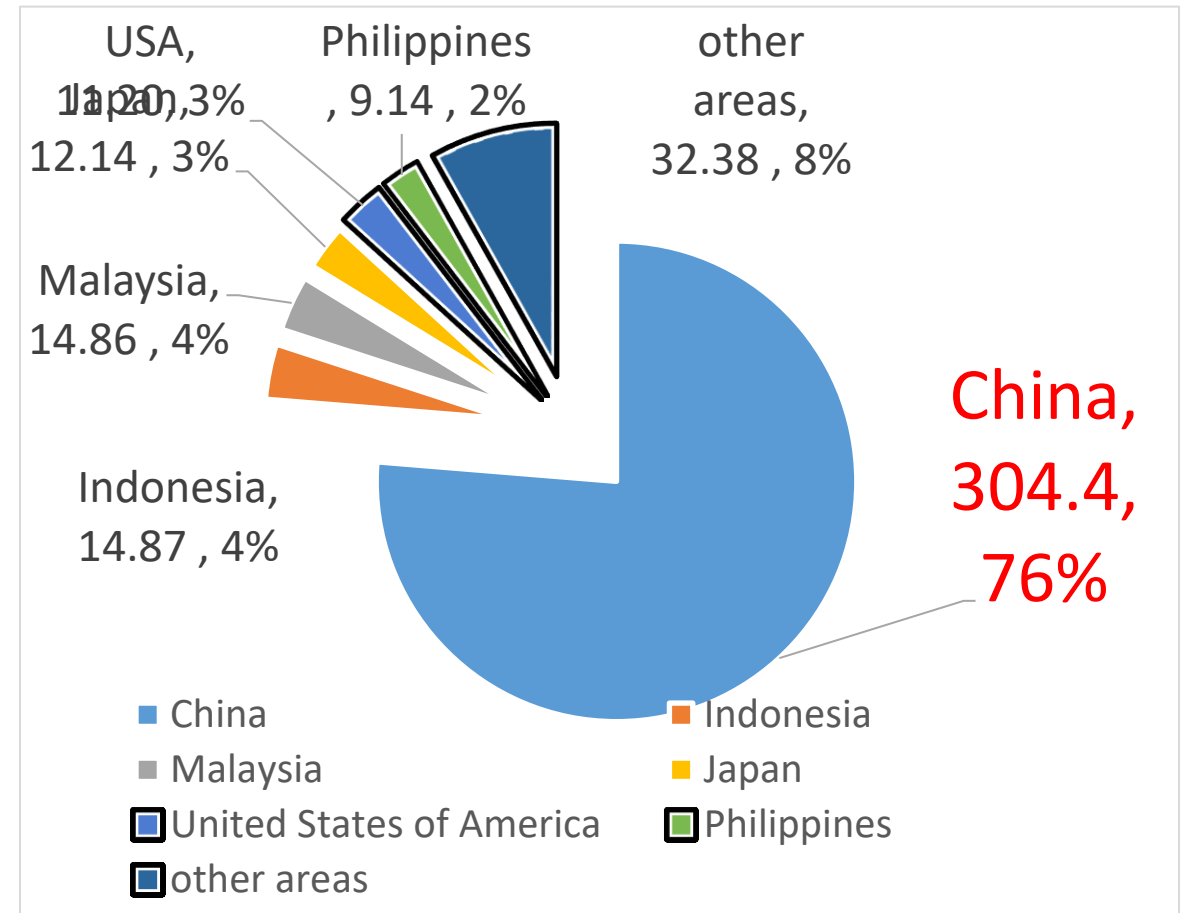
Ranking and distribution of global cassava production in 2020 (,000 tons)



Import volume and proportion of cassava dried chips by main importers in 2020



Import volume and proportion of cassava starch in main importing countries in 2020



Comparative Advantages

Huge
research
teams

Strong
financial
support

Rich
research
platforms

Advanced
cultivation
techniques

Strong
processing
ability

Huge
market
space

Developed
transportati
on network

Mature
business
environment



Demands

- ***Good Varieties: high root yield, high dry matter content, high starch content; early harvesting(6-7 MAP); adaptation to unfavorable conditions; Strong resistance to diseases and pests; high tolerance to low temperature; high converting rate to alcohol /ethanol.***
- ***Green and efficient cultivation techniques.***
- ***Light and simplified processing technology for small holders.***
- ***Comprehensive technology to process by-products.***
- ***High value-added cassava-based products.***



Challenges

- *Threat of cassava Mosaic disease, mite and weeds to cassava plantations;*
- *Labour costs have soared and fewer young people engage in agriculture;*
- *Benefit of planting cassava is not high compared with other economic crops.*
- *Low comprehensive utilization and poor overall benefits;*
- *Reduced production due to typhoon, drought and other extreme weathers;*



Strategy

- *Select and breed high quality food and feed varieties to meet the demand of cassava industry;*
- *Develop integrated food and feed processing technologies to enhance cassava value chain;*
- *Delve into cassava mechanized planting technology, reduce the dependence on labor force, and improve cassava planting income.*



Key Action

- *To design breeding targets and breed varieties resistant to disease with slow postharvest physiological decay rate to cater into various demands of the market;*
- *Enhance research and development of planting machinery, realize the whole process of cassava planting, managing and harvesting mechanization, reduce labor input, increase planting efficiency and income;*
- *Enhance research and development of light and simplified cassava flour processing technology and equipment, develop more cassava food, improve cassava product income;*
- *Develop bio-fermented feed with whole cassava plant for livestock industry and improve added value.*



Key Technologies

- *Efficient biological breeding techniques for cassava*
- *Cassava mechanization for production and processing*
- *Light and simplified tapioca processing technology*
- *Technology of cassava bio-fermented feed*
- *Production technology of cassava snacks*
-



Effectiveness

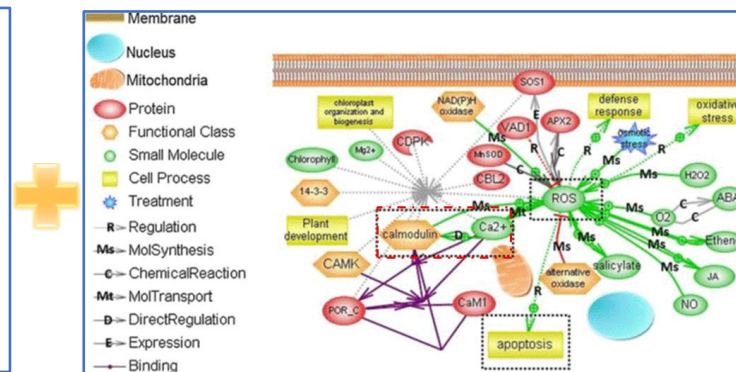
A new variety SC14 with both grain and diet and PPD resistance was developed to extend the shelf life of cassava by 15 days. The rotting loss rate of fresh cassava during transportation and processing was reduced from 15% to 1%.



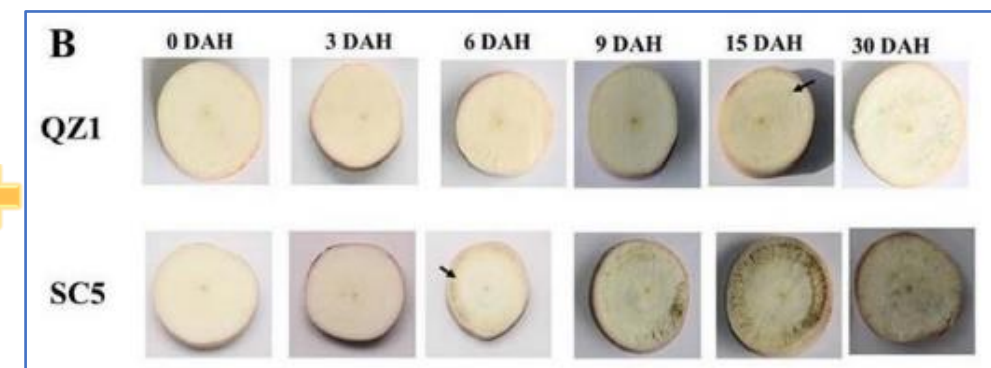
Days after root harvest (DAH)



Traditional cross breeding techniques



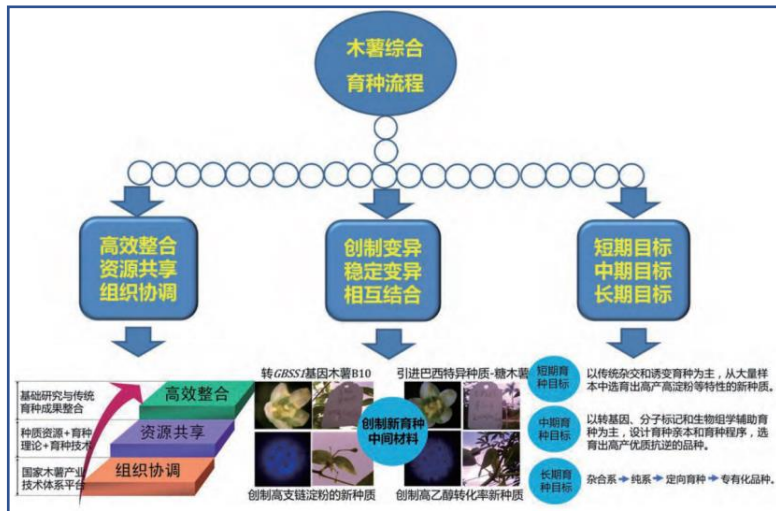
Proteomics assisted breeding



Phenotypic data of root tuber PPD

Effectiveness

*The first new variety SC13 with high resistance to *Tetrastinus cinnabarinus* and high yield and high starch has been cultivated, which has become the main food and feed variety in the countries along the "Belt and Road".*



Integrated breeding strategy

抗性水平 免疫 (IM)	种质名称
高抗 (HR)	ZMF701 (SC13)
抗 (R)	缅甸种 华南 10、华南 8013、ZM 8229、ZM 8625、ZM 8701、ZM 8752、ZM 96114、ZM 96135、ZM 9710、GR 911 BRA 206、BRA 273、BRA 274、FLAxxx-12、FLAxxx-25、ECU 81、GUA 76、CMR 35-22-196、CMR 35-70-1、瑞士NO12、瑞士Q10、瑞士S8、瑞士U6、瑞士W4、R 1
中抗 (MR)	华南 5、华南 6、华南 7、华南 8、华南 9、华南 12、华南 8002、华南 6068、宝岛 9-1、宝岛 9-2、宝岛 9-3、宝岛 9-5、植灰、华南 124 多倍体、华南 6068 多倍体、ZM 7901、ZM 8229 多倍体、ZM 8316、ZM 8340、ZM 8641、ZM 9036、ZM 9079、ZM 9242、ZM 9244、ZM 93164、ZM 93236、ZM 93274、ZM 9419、ZM 9426、ZM 9495、ZM 94107、ZM 95027、ZM 95111、ZM 95125、ZM 9713、ZM 9781、ZM 98173、ZM

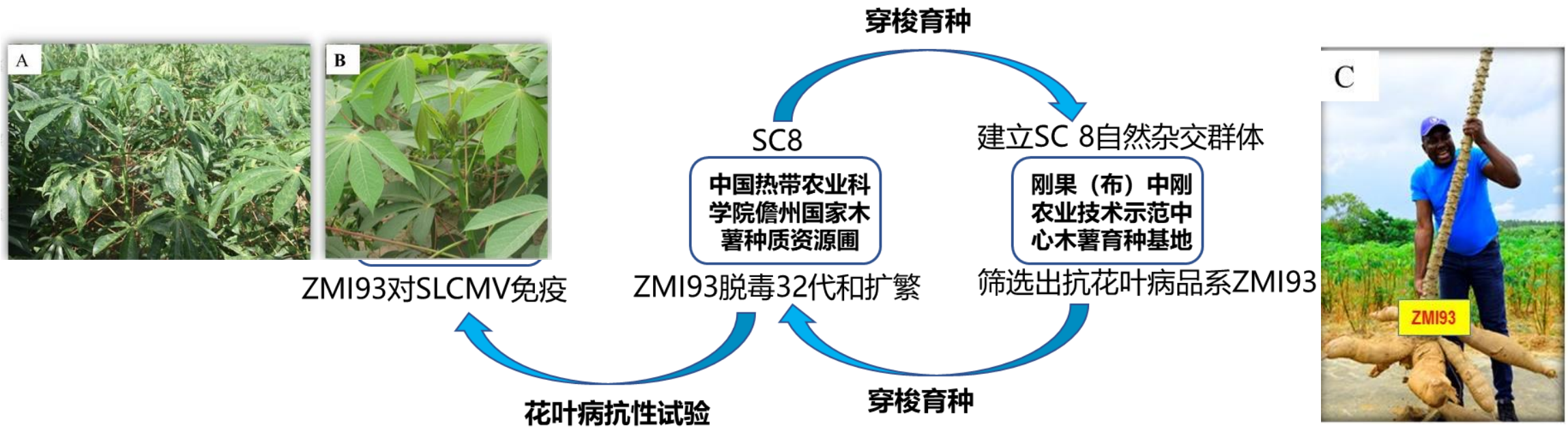
Phenotypic data for resistance evaluation



SC13 is widely cultivated in Cambodia

Effectiveness

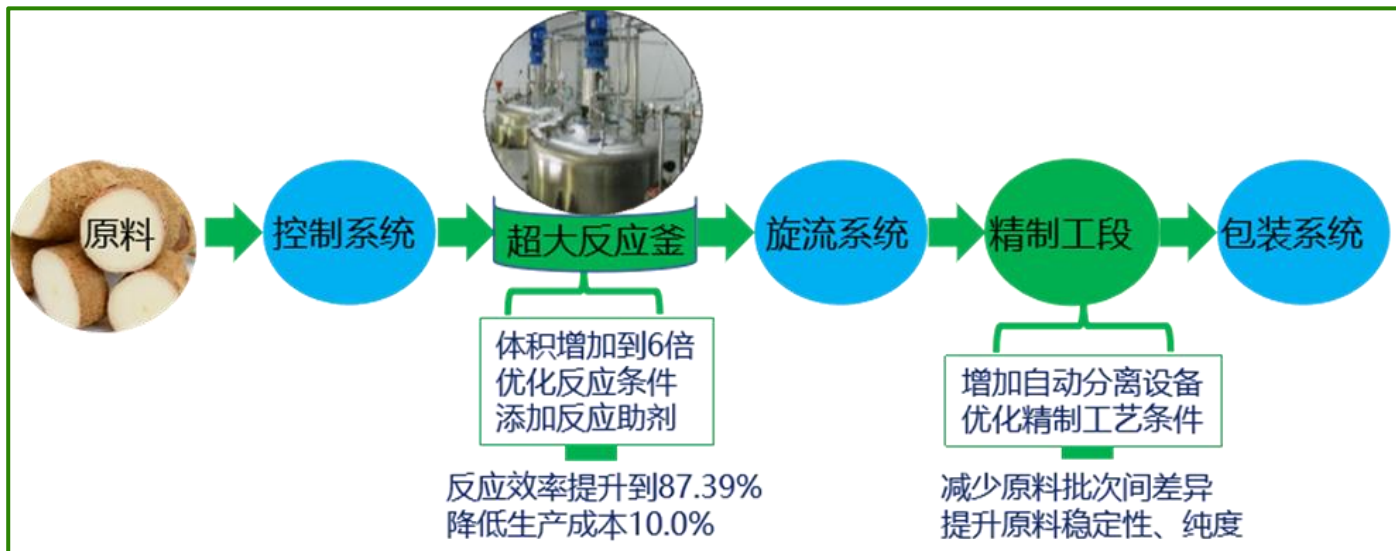
Line ZMI93 with high yield and high resistance to Mosaic disease was screened out, and the disease index was zero. The maximum yield of root tuber was 162.75 t/ha, far exceeding the maximum theoretical yield of 90 t/ha predicted by CIAT, which ensured the supply and quality of feedstock and cassava food.



A: Cassava in Cambodia is heavily infected with SLCMV; B: SLCMV resistant cassava line ZMI93 ; C: ZMI93 tuber root

Effectiveness

For processing cassava modified starch, the first domestic super-large reaction system was developed to reduce the difference between batches and ensure the purity of starch slurry, improve the stability of raw materials, lower the production cost by 10%, and add the output value by 104.1%.

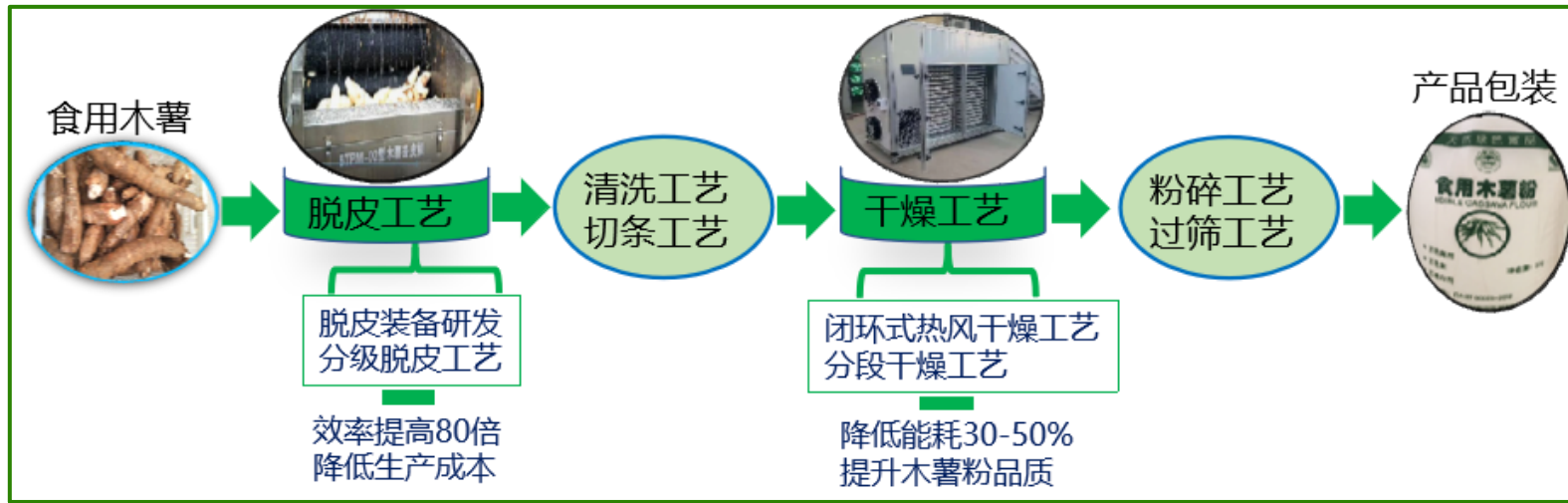


Processing process of cassava modified starch for food

Modified starch for food is applied in food enterprises to improve output value

Effectiveness

It integrates small, light and simplified processing technology of edible tapioca flour, improves the quality of tapioca flour, increases production efficiency by more than 80 times, and reduces energy consumption by 30% ~ 50%; It developed 128 kinds of tapioca special food, such as tapioca rice cake, noodles, biscuits and mooncakes, and its output value increased by 435.7%.



Small and light simplified processing process of edible tapioca flour

Special cassava food, the output value has been increased 435.7%

Effectiveness

Integrated feed utilization technology of cassava stem, leaf and the whole plant can develop healthy and anti-resistant bio-fermented feed, increase output value by 257.1% and reduce production cost by 20%; Integrated optimization of cassava stem base utilization technology uses cassava substrate to replace traditional ones by more than 30%, saving 15% of cultivation cost and improving the overall industrial benefits.



Cassava whole plant can be processed into feed, output value can increase 257.1%



Using cassava stalk substrate to cultivate edible fungi such as oyster mushroom etc

Effectiveness

The use of new varieties with high yield and mosaic resistance and the whole biological fermented feed and the supporting processing technology it used can effectively relieve the feed supply pressure faced by domestic breeding and feed enterprises, reduce the competition between feed grains and rations, such as grains and soybeans, and contribute to the national food and feed security supply.



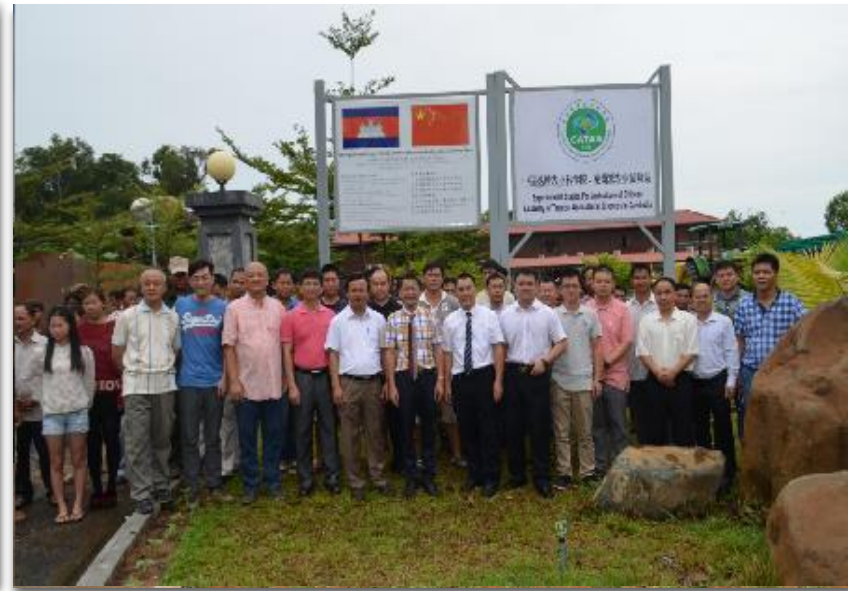
Cassava whole-plant bio-fermented feed has obtained ferment, and the feeding experiment demonstration base in Hainan

Effectiveness

It has integrated and innovated light and simplified cassava technologies, and shared to some cassava producing countries in Africa and Southeast Asia, enhancing the competitiveness of the local cassava industry.



The whole set of varieties + agricultural machinery + processing technology was exported to Uganda, Cambodia and other countries



中国-柬埔寨农业试验站 China-Cambodia Agro-Exp. Station





**China -Aided the Republic of Congo
Agricultural Demonstration Center (CCADC)**



A, The review of CCADC blueprint in Congo (Brazzaville);
 B, Mr. Hui Liangyu Vice Premier of China and Mr. Denis Sassou-Nguesso President of Congo (Brazzaville) attended the unveiling ceremony of CCADC in Sept 4, 2012;
 C, Vice president of CATAS, prof. Liu Guodao answered the questions issued from reporters in CCADC.

中国热带农业科学院
 Chinese Academy of Tropical Agricultural Sciences (CATAS)

院领导 组织机构 科研成果 科技平台 国际交流 科技开发 人才队伍 党建文化 文化建设

单株鲜薯38公斤 品质所在刚果(布)试种的木薯品种成果喜人
 作者: 品质所 发表时间: 2015-09-A点击:97

**中国--刚果 (布) 农业试验站
 China-Congo Agro-Exp. Station**

**Improved new variety
 38 kg/plant
 25 tons /ha**



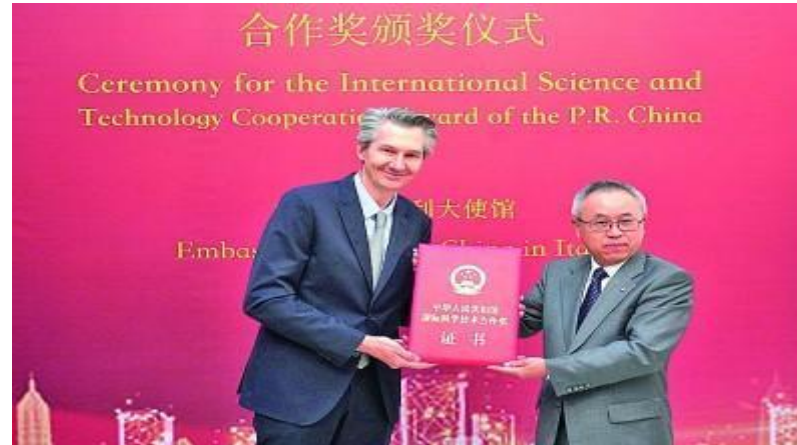
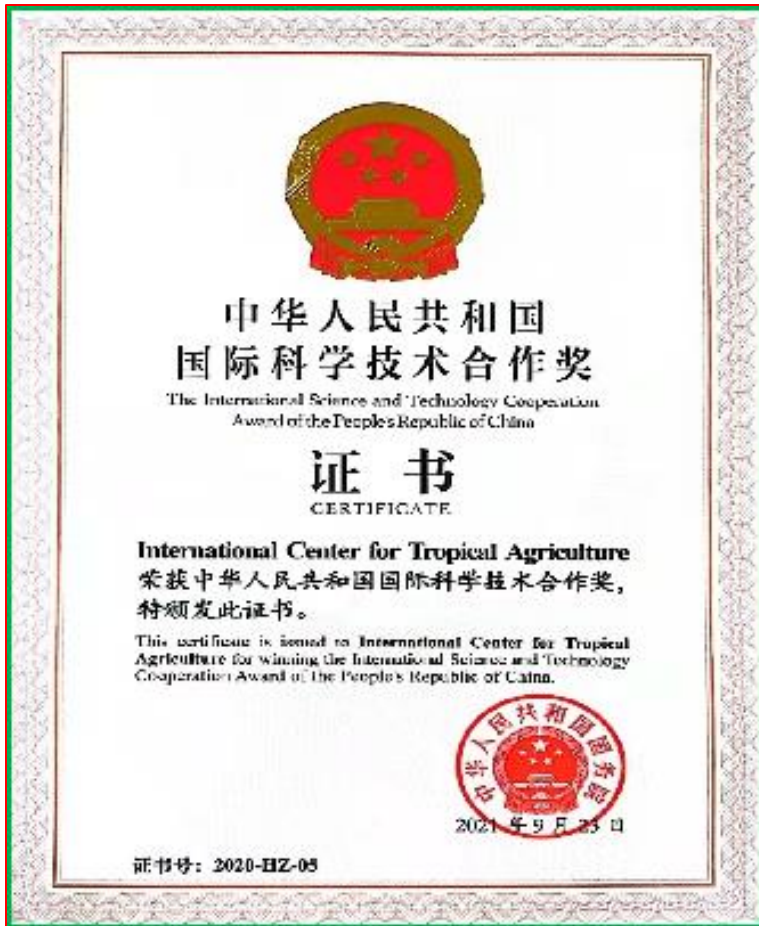
Effectiveness--International Cooperation



SINCE 1982, established and strong working relationships with the International Center for Tropical Agriculture (CIAT)



The Alliance of Bioversity International and International Center For Tropical Agriculture(CIAT) win China International Science and Technology Cooperation Award in 2020



Experience and Lessons

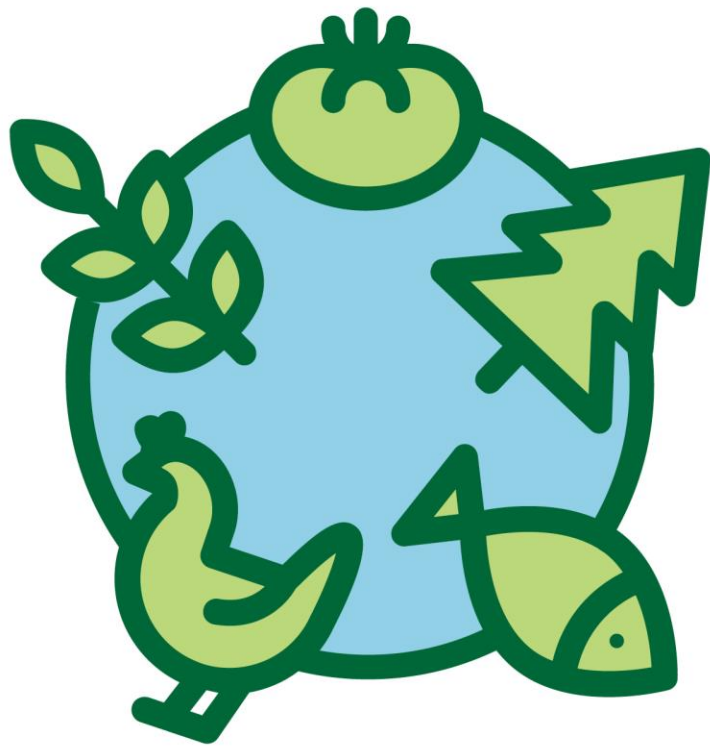
- *Obtain government policy and financial support,*
- *Increase investment in CASSAVA science and technology,*
- *Strengthen cooperation between enterprises and research institutions to commercialize scientific and technological achievements;*
- *Training cassava farmers to learn and use more practical techniques in a timely manner;*
- *Strengthen international cooperation and exchanges, give full play to the role of international organizations, and share the latest cassava science and technology and the best scientific research results.*



Suggestions

- *It is recommended that the government introduce a series of policies to encourage the development of cassava industry, making cassava planting a national strategy;*
- *Strengthen the cooperation between scientific research institutions and enterprises, set up research projects together, tackle industrial bottlenecks and share the benefits;*
- *Strengthen training of smallholder farmers in cassava production and simple processing techniques to improve income;*
- *Encourage the establishment of planting and breeding farms to develop circular agricultural system and achieve win-win results.*





Thank you