



木薯生产机械化研究与应用

Research and Application of Cassava Production Mechanization

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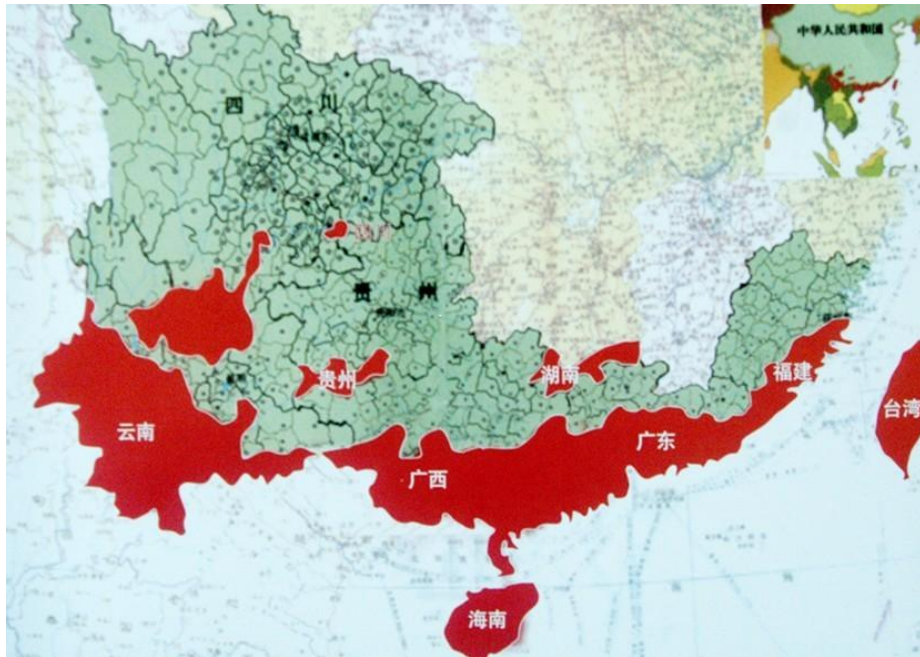
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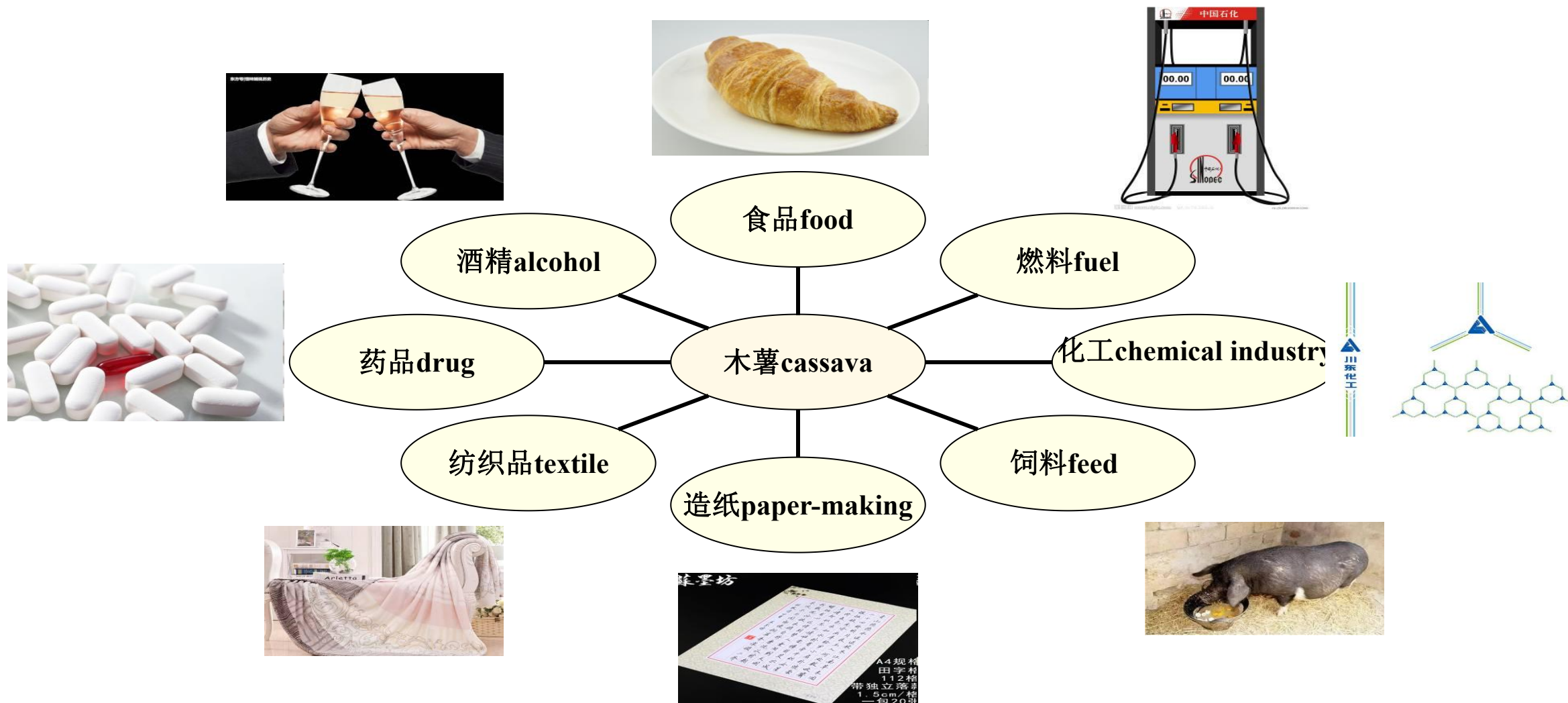
中国木薯产业基本情况 Basic information of cassava industry in China

- 1、木薯在中国已有200年的种植历史Cassava has been cultivated in China for 200 years
- 2、年种植面积约40万公顷，主要分布于广西、广东、海南、云南、福建、贵州、湖南、江西等省区The annual planting area is about 400,000 hectares, mainly distributed in Guangxi, Guangdong, Hainan, Yunnan, Fujian, Guizhou, Hunan, Jiangxi and other provinces
- 3、近年来，北方省份山东、河南、西部省份新疆也在进行种植试验In recent years, the northern provinces such as Shandong, Henan, and the western province , Xinjiang have also been conducting plantation experiments.



中国木薯产业基本情况 Basic information of cassava industry in China

► 木薯在中国用途广泛 Cassava is widely used in China



中国木薯产业基本情况 Basic information of cassava industry in China

➤木薯在中国农业经济中占有非常重要的地位 Cassava plays a very important role in China's agricultural economy

❖木薯是中国三大热带作物之一 Cassava is one of the three major tropical crops in China

❖木薯和甘蔗轮作是一种重要的土壤保护耕作方式，特别是在华南地区 Cassava and sugarcane crop rotation is an important soil conservation tillage method, especially in South China

❖利用木薯生产燃料乙醇是中国可再生能源发展的重点方向 Using cassava to produce fuel ethanol is a key direction for renewable energy development in China

❖木薯在加工地方特色食品方面有着悠久的历史 Cassava has a long history in being used for processing local specialty foods

❖应用全株木薯饲料，满足当地畜牧业发展 Application of whole-plant cassava feed to meet the development of local livestock industry

➤ 木薯种茎人工切割 Manual cutting of cassava seed stems



- ❖ 种茎长度均匀性差 poor uniformity of seed stem length
- ❖ 效率低下 low efficiency

中国木薯产业基本情况 Basic information of cassava industry in China

➤ 人工施肥和人工下种 Manual fertilization and manual seeding



- ❖ 下种量、施肥的精度差 Poor precision of seeding volume and fertilizer application
- ❖ 下种间隔和施肥间隔的均匀性差 Poor uniformity of sowing spacing and fertilizer application spacing
- ❖ 效率低，劳动强度大 Low efficiency and high labor intensity

中国木薯产业发展现状 Development status of cassava industry in China

➤ 人工砍伐和清除木薯秸秆 Manual felling and removal of cassava straw

❖ 木薯秸秆量大 Cassava has a lot of straw

❖ 效率低，劳动强度大 Low efficiency and high labor intensity



中国木薯产业发展现状 Development status of cassava industry in China

➤ 人工挖掘木薯块根 Manual digging of cassava tubers



❖ 劳动强度大 high labor intensity

❖ 挖掘效率低下 low efficiency of digging

中国木薯产业发展现状 Development status of cassava industry in China

➤ 人工分离薯块和装车 Manual separation of potato pieces and loading



- ❖ 劳动强度大
high labor intensity
- ❖ 效率低下
low efficiency

中国木薯产业发展现状 Development status of cassava industry in China

➤ 薯块转运 transport of cassava tubers

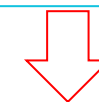


人工拣薯装车

Manual potato picking
and loading



运输以集中存储
Transport for
centralized storage



大卡车运到加工厂
Transported to the
processing plant by
large trucks

木薯田间生产总体情况 **General situation of cassava field production:**

- ❖ 依靠体力劳动 **rely on manual labor**
- ❖ 效率低下 **low efficiency**
- ❖ 劳动密集型 **labor-intensive**
- ❖ 生产成本高 **high production cost**
- ❖ 劳动力需求大 **High demand for labor**

用机械代替体力劳动是中国木薯种植农户的共同愿望 **Replacing manual labor with machinery is the common desire of Chinese cassava farmers**

推进机械化是当前中国木薯产业的发展方向 **Promoting mechanization is the current development direction of China's cassava industry**

➤ 劳动力短缺是中国木薯生产的主要问题 Labor shortage is the main problem of cassava production in China :

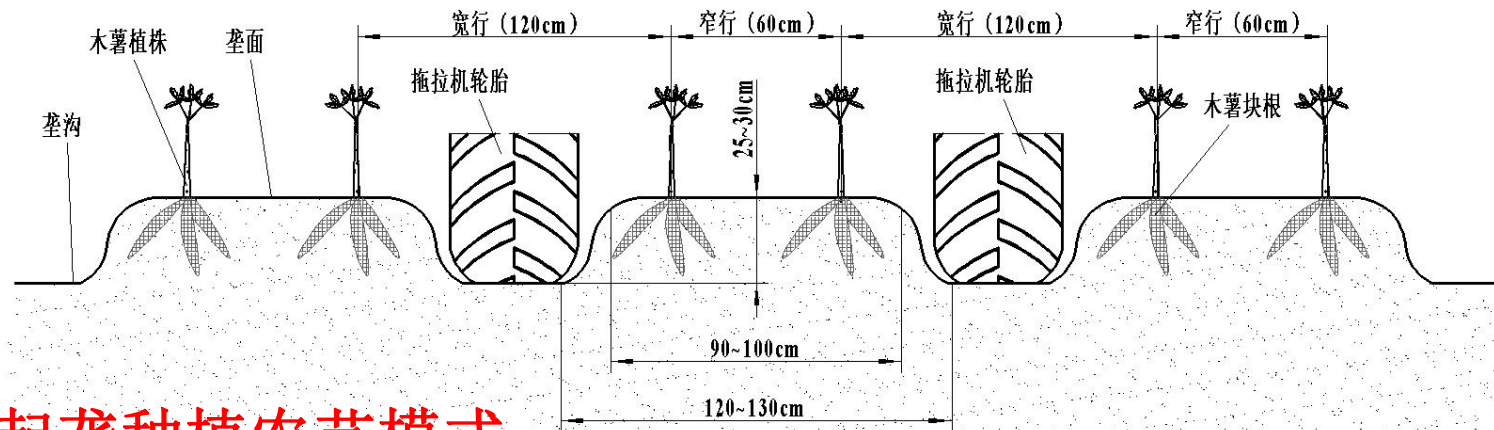
- ❖ 农村人口迁移到城市从事工业和服务业 Rural population migrating to cities to work for industry and services
- ❖ 低收入和恶劣的工作条件无法吸引年轻人 Low income and poor working conditions do not attract young people
- ❖ 农民老龄化日益严重 Increasing aging of farmers

➤ 木薯机械化生产存在的问题 Problems existing in mechanized cassava production :

- ❖ 传统木薯种植模式等行距与农机轮距不匹配 The equal row spacing of traditional cassava planting pattern does not match the wheel track of farm machinery
- ❖ 现有地块小、地势丘陵等耕地条件难以满足农机作业的要求 Small plots, hilly terrain and other farming conditions make it difficult to meet the requirements of farm machinery operations

木薯生产机械化研究进展 Progress of research on mechanization of cassava

- 适宜机械化作业农艺模式: **木薯宽窄双行起垄种植农艺模式**
- Agronomic model suitable for mechanized operation: **a cassava agronomic model with wide and narrow double-row ridging planting**
 - ❖ 适用于 90 马力拖拉机 Suitable for 90 horsepower tractors
 - ❖ 垄作有利于木薯根系的生长和机械化收获 Ridge planting is good for cassava root growth and mechanized harvesting
 - ❖ 种植距离 70-80 cm, 鲜木薯产量 30 t/hm² 以上 Planting spacing of 70-80 cm, fresh cassava yield of above 30 t/hm²



木薯宽窄双行起垄种植农艺模式

a cassava agronomic model with wide and narrow double-row ridging planting

➤ 机械化起垄 mechanized ridging



用于**构建种植垄体种床**，能同时完成旋耕、碎土、起垄作业It is used to **build the seed bed for ridging planting**, and can complete the operation of rototilling, soil crushing and ridging at the same time.

技术参数technical parameters	
型号Model	1GL-180
配套动力Matched Power(KW)	≥ 67
重量 Weight(kg)	510
垄底宽度Width of Ridge Bottom(cm)	170~180
垄顶宽度Width of Ridge Top(cm)	90~110
起垄高度Ridging Height(cm)	25~35
尺寸Size (长length×宽width×高height, cm)	128×232×128
生产效率Production Efficiency(hm ² /h)	0.6



► 实时切种式木薯种植机 Real-time seed cutting type cassava planters



技术参数 technical parameters

型号 Model	2CM-2
配套动力 Matched Power (KW)	≥ 67
重量 Weight (kg)	850
种植行数 Planting rows	2
载种量 Seed loading amount (kg)	600
装肥量 fertilizer loading amount (kg)	300
尺寸 size (长 × 宽 × 高, cm)	175 × 280 × 245
生产效率 production efficiency (hm ² /h)	0.35
种植株距 planting space (cm)	60~70

适用于长直杆木薯品种种植作业，能同时完成开沟、施肥、切种、排种、镇压作业。It is suitable for planting long and straight cassava varieties and can complete trenching, fertilizing, seed cutting, seed discharging and compacting at the same time.



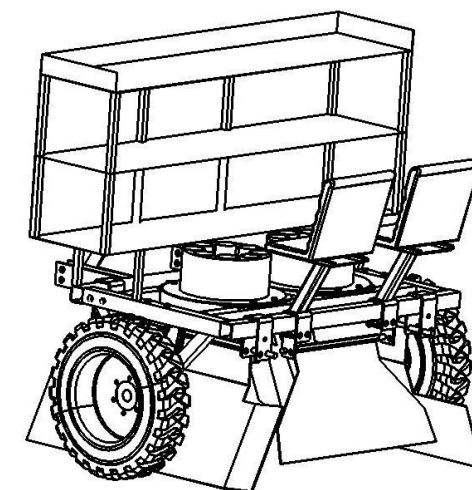
► 预切种式木薯种植机 Pre-cut seed cassava planters

适用于矮杆开叉木薯品种种植作业，能同时完成开沟、施肥、切种、排种、镇压作业 Suitable for the planting operation of dwarf cassava varieties with branches, can complete the furrowing, fertilizing, seed cutting, seed discharging and compacting operation at the same time



技术参数 technical parameters

技术参数 technical parameters	
型号 model	2CMY-2
配套动力 matched power (KW)	≥ 67
重量 Weight (kg)	750
种植行数 planting rows	2
载种量 seed loading amount (kg)	600
尺寸 size (长 length × 宽 width × 高 height, cm)	175 × 280 × 245
生产效率 production efficiency (hm ² /h)	0.35
种植株距 planting space (cm)	60~70



➤ 喷药机 Spraying machine

主要用于木薯出苗前喷洒除草剂，能同时完成5垄喷药作业It is mainly used for spraying herbicide before cassava seedling emergence, and it can complete the spraying operation of 5 ridges at the same time.



技术参数 technical parameters

型号 model	3WPM-500
配套动力 matched power(KW)	≥ 67
重量 weight(kg)	230
作业幅宽 operation breadth (m)	10
载药量 drug loading capacity(L)	500
尺寸 size(长length × 宽width × 高height, cm)	225 × 350 × 150
生产效率 production efficiency (hm ² /h)	1.5



►木薯双行垄作生长情况cassava growing condition of double-row ridging operation



➤ 木薯秸秆粉碎还田机 field cassava straw chopper

用于木薯块根**挖掘收获前**的木薯秸秆粉碎还田处理 For chopping cassava straw and returning it to the field before digging and harvesting cassava tubers



技术参数 technical parameters

型号 model	4JMD-180
配套动力 matched power(KW)	≥ 67
重量 weight(kg)	1000
作业幅宽 operation breadth(cm)	180
粉碎率 grinding rate(%)	≥90
尺寸 size (长length × 宽width × 高 height, cm)	165×230×120
生产效率 production efficiency(hm ² /h)	0.4



➤ 自走式木薯茎叶粉碎收割机 Self-propelled cassava stem and leaf chopping harvester

用于木薯茎叶青贮饲料化收割，能同时完成木薯茎叶收割、粉碎、收集 For cassava stems and leaves silage harvesting, can complete cassava stems and leaves harvesting, grinding, collection at the same time



技术参数 technical parameters

型号 model	4JMG-190
配套动力 matched power (KW)	≥ 92
重量 weight (kg)	6000
作业幅宽 operation breadth (cm)	190
割茬高度 Stubble height (cm)	≤ 35
尺寸 size (长 length × 宽 width × 高 height, cm)	680 × 220 × 340
生产效率 production efficiency (hm ² /h)	0.4
粉碎合格率 Grinding qualification rate (%)	≥ 95.4%



► 牵引式木薯茎秆粉碎收集机 Pull-type cassava stalk chopping and collecting machine



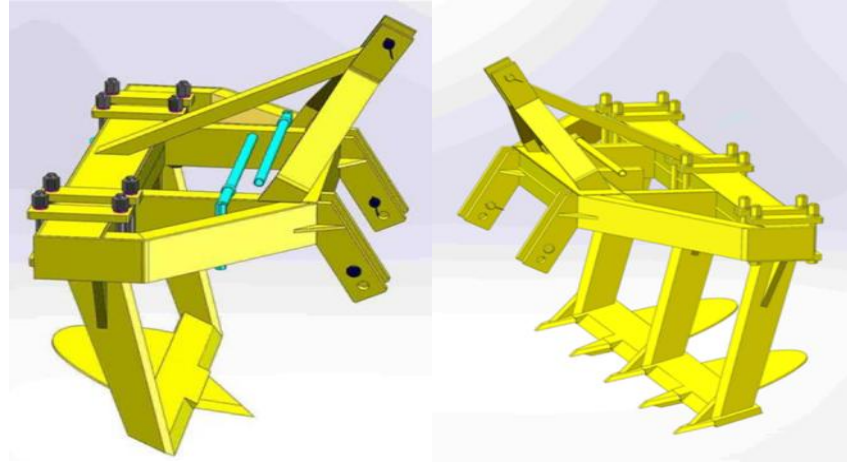
用于木薯块根**挖掘收获前**，木薯茎秆粉碎收集**综合利用**处理，如栽培基质等Used for comprehensive utilization and disposal of cassava stalk crushing and collection before excavation and harvesting of cassava tubers, such as culturing substrate

技术参数technical parameters

型号model	4JMS-150
配套动力matched power(KW)	≥ 67
重量weight(kg)	920
作业幅宽operation breadth(cm)	150
装载容积loading capacity (m ³)	1.6
尺寸size (长length × 宽width × 高,height cm)	300 × 210 × 290
生产效率production efficiency(hm ² /h)	0.4
粉碎合格率grinding qualification rate(%)	≥ 97%

➤ 固定铲式木薯收获机 Fixed shovel-type cassava harvester

用于木薯块根挖掘收获，结构简单，制造成本低，但挖掘阻力大，损失率高
For cassava root excavation and harvesting, has simple structure, low manufacturing cost, but high digging resistance, high loss rate



► 振动链式木薯收获机 Vibrating chain-type cassava harvester



用于木薯块根**挖掘收获**，能同时完成挖掘、薯土分离，明薯率高，牵引阻力小
 Used for cassava root excavation and harvesting, can complete excavation and separation of soil and cassava at the same time, high cassava-exposing rate, low tractive resistance

技术参数 technical parameters

技术参数 technical parameters	
型号 model	4UML-130
配套动力 matched power (KW)	≥ 67
重量 weight (kg)	420
作业幅宽 operation breadth (cm)	130
挖掘深度 excavation depth (cm)	25~30
尺寸 size (长 length × 宽 width × 高 height, cm)	250 × 160 × 110
生产效率 production efficiency (hm ² /h)	0.4
明薯率 cassava-exposing rate (%)	≥ 95%



➤ 拨棍式木薯收获机 Toggle roller-type cassava harvester

用于木薯块根**挖掘收获**，能同时完成挖掘、薯土分离，收获率高，但挖掘阻力大，伤薯严重
Used for cassava root excavation and harvesting, can complete excavation and separation of cassava and soil at the same time, with high harvesting rate, but the excavation resistance is large and the cassava is seriously damaged.



➤ 振动铲式木薯收获机 Vibrating shovel-type cassava harvester

用于木薯块根**挖掘收获**，明薯率高，挖掘阻力小 For cassava tuber excavation and harvesting, with high cassava-exposing rate, low digging resistance



技术参数 technical parameters

型号 model	4MSZ-140
配套动力 matched power(KW)	≥ 67
重量 weight(kg)	600
作业幅宽 operation breadth(cm)	140
挖掘深度 excavation depth(cm)	25~30
尺寸 size(长 length × 宽 width × 高 height, cm)	210 × 150 × 170
生产效率 production efficiency(hm ² /h)	0.4
明薯率 cassava-exposing rate(%)	≥ 95%



木薯去皮机Cassava Peeler

用于木薯块根去皮初加工，能同时完成去皮、清洗作业
Used for primary processing of cassava root peeling, can complete peeling and cleaning operation at the same time



技术参数technical parameters	
型号model	5TPM-02
功率Power(KW)	1.5
重量weight (kg)	300
额定电压nominal voltage (V)	220
尺寸size (长length × 宽width × 高,height cm)	90×106×122
生产效率production efficiency (kg/h)	200



木薯生产机械化的经济分析 Economic analysis of mechanization of cassava production

人工生产与机械化生产的效率、成本比较 Efficiency and cost comparison of manual and mechanized production			
作业环节 operation steps	人工 / 机械 manual/mechinery	作业效率 operation efficiency	作业成本 operation cost (RMB/ hm ²)
种植 planting	人工 manual	0.06 hm ² / 8h	1200
	机械化 mechanization	5 hm ² / 8h	600
秸秆处理 straw treatment	人工 manual	0.12 hm ² / 8h	1800
	机械化 mechanization	5 hm ² / 8h	450
收获 harvesting	人工 manual	0.06 hm ² / 8h	1800
	机械化 mechanization	3.2 hm ² / 8h	600
<p>❖ 人工生产成本 cost of manual production 4800 RMB / hm²</p> <p>❖ 机械化生产成本 cost of mechanized production 1650 RMB / hm²</p> <p>❖ 机械化生产成本仅是人工生产成本的1/3，机械化生产效率是人工生产效率的40倍以上 The cost of mechanized production is only 1/3 of the cost of manual production, and the mechanized production efficiency is more than 40 times of manual production efficiency.</p>			

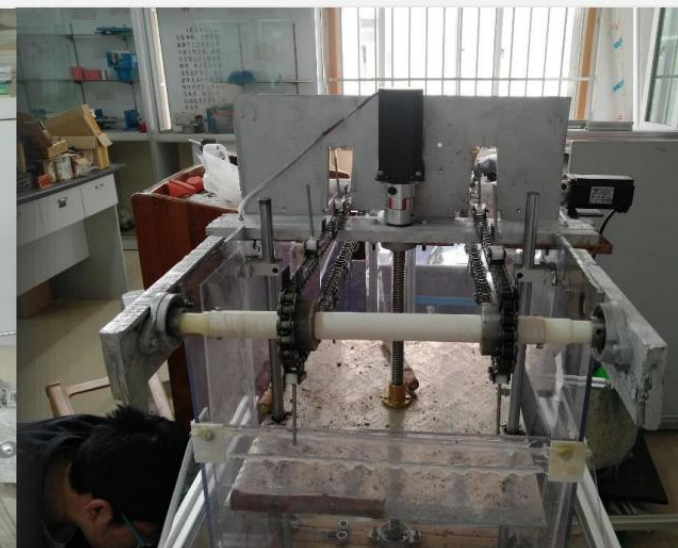
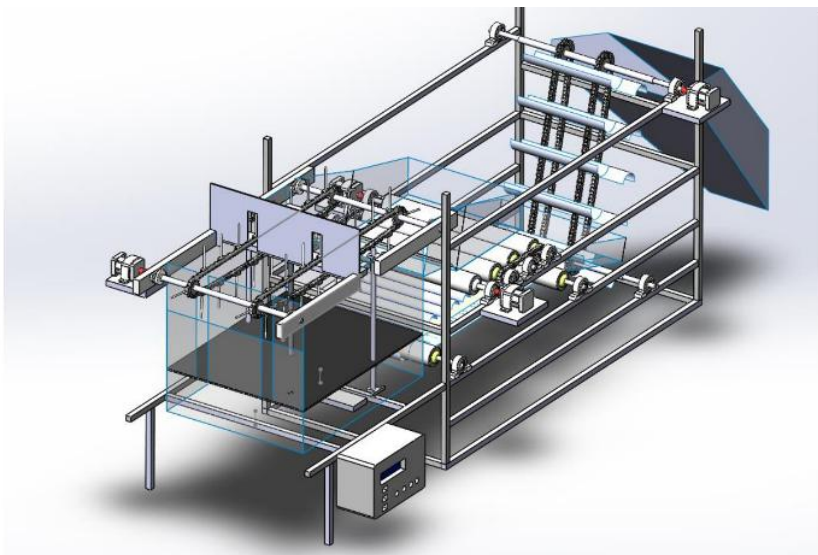
木薯生产机械化的经济分析Economic analysis of mechanization of cassava production

200公顷木薯种植面积的农机配套Supporting agricultural machinery for 200 hectares of cassava planting area

设备名称device name	数量amount	使用寿命service life (年)
拖拉机tractor(90hps)	1	20
三铧犁three-furrow plough	1	10
旋耕机rotary cultivator	1	6
起垄机ridger	1	6
种植机planter	1	6
秸秆粉碎还田机field straw chopper	1	6
收获机harvester	1	6
总计total	7	/

按每年每个作业环节有效作业时间60天计，平均每台机具每天可作业3-4公顷，每套机具可管理180-200公顷木薯种植园。Based on the effective operating time of 60 days per year for each operation section, each machine can operate 3-4 hectares per day on average, and each set of machine can manage 180-200 hectares of cassava plantation.

➤ 木薯自动种植机Automatic cassava planter



工作原理operating principle:

木薯种茎定向排序
Directed sorting of
cassava seed stems



木薯种茎定量排种
Quantitative seeding
of cassava seed stems

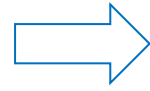
- ❖ 木薯种茎自动种植Automatic planting of cassava seed stems
- ❖ 节省2名辅助工人Save 2 helpers
- ❖ 提高生产效率Increase production efficiency
- ❖ 降低生产成本Reduce production cost

木薯生产机械的未来方向Future development of machinery for cassava production

➤ 木薯联合收获机Combine cassava harvester

作业流程work flow:

振动铲挖掘木薯块根Vibrating shovel to dig cassava tubers



传送链将木薯块根输送到转运车Conveyor chain conveys cassava tubers to transfer trucks

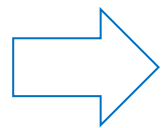


木薯生产机械的未来方向 Future development of machinery for cassava production

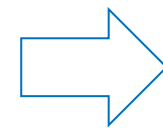
➤ 后收集斗式木薯联合收获机 Rear collecting bucket-type cassava combine harvester

作业流程 work flow:

振动铲挖掘木薯块根
Vibrating shovel
to dig cassava
tubers



输送链将木薯块根运送到收集箱
Conveyor chain transports
cassava tubers to collection
boxes



地头卸载至运输车
unloading to
transport truck
on edges of the
field



木薯生产机械的未来方向 Future development of machinery for cassava production

➤ 连续式自动去皮机 Continuous automatic peeling machine

作业流程 work flow:

自动提升输送木薯块根

Automatic lifting and conveying of
cassava tubers



自动去皮清洗

Automatic
peeling and
cleaning



自动排出
automatic
discharge



感谢聆听

Thank you

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