

青岛秸秆综合利用现状与项目实施方案 (2018-2020)

**Findings and Outcomes of the Survey
and Description of the Workplan (2018-2020)**

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● 汇报提纲 / *outline*

一、背景介绍
Background

二、效益评估
Socio-economic assessment

三、项目实施方案
Project strategy

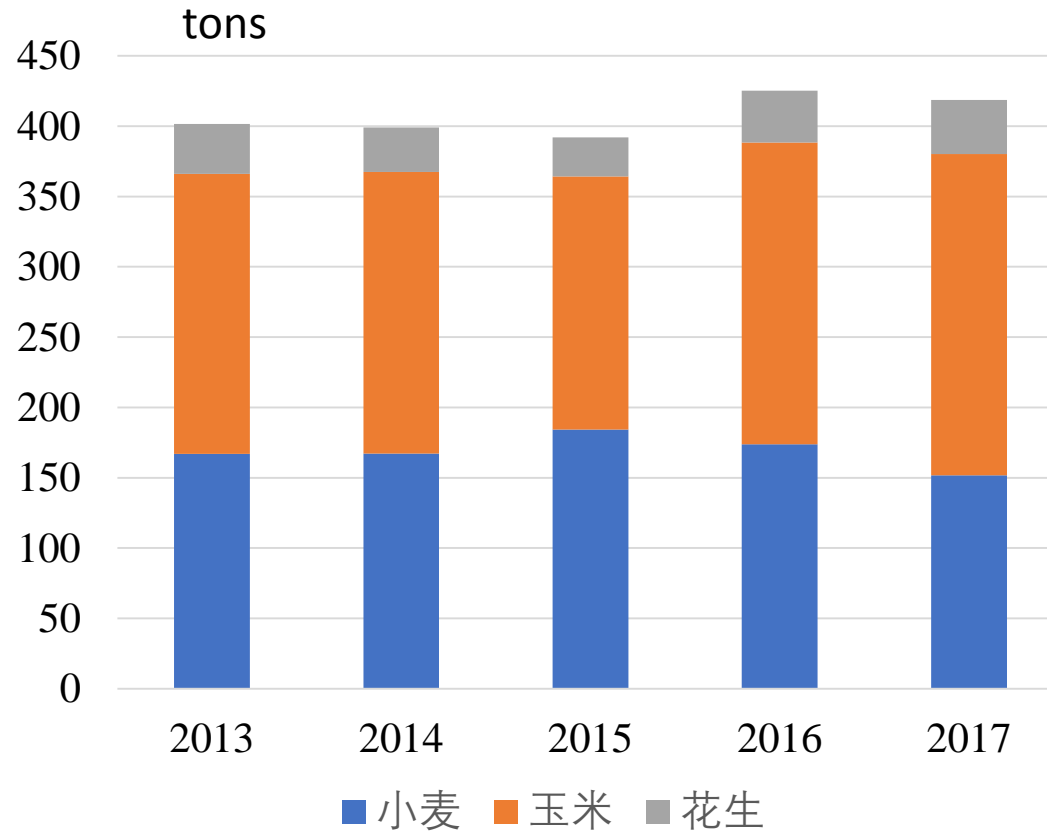
背景 Background

- 位于山东省南部，毗邻黄海
South of Shandong province, adjacent to the Yellow Sea.
- 总面积(Area) 10,654 km² ; 人口(Population) 7629.2 thousand
- 温带季风性气候，典型海洋性气候
Temperate monsoon climate with distinctive marine climate characteristics
- 土地和水资源丰富，一年两熟（小麦-玉米）
Rich in land and water resources, annual double cropping area (winter wheat-summer maize)



青岛适合农业生产
Suitable for agricultural production

背景 Background



青岛秸秆量巨大，每年可收集秸秆量约**4百万吨**

About annual 4 million tons straws can be collected

背景 Background

青岛秸秆分布 Straw distribution

- 分布在平度，莱西，胶州，即墨；
The crops mainly distributes in Pingdu, Laixi, Jiaozhou and Jimo
- 莱西面积为105万亩，单产433 kg/亩
Crop yield: 6500 kg/ha
- 莱西小麦、玉米、花生秸秆产量超过80万吨
The three main crops (Wheat, Maize and Peanut) annually produce >800 thousand tons of straws



莱西秸秆综合利用面临着巨大的压力

Great challenge for Laixi!



1.肥料化
Fertilizer



2.饲料化Fodder

秸秆综合利用
Integrated Straw
Management



3.能源化
New energy
resources



4.基料化
Base stock



5.原料化
Industry material

秸秆利用方式 Straw utilization



① 秸秆直接还田 Straws returning to the fields



② 堆沤还田
Pre-decomposed
returning



③ 牛粪还田
Manure straw
returning

肥料化

Fertilizer

秸秆利用方式 Straw utilization

饲料化

Fodder

青贮饲料Ensilage



喂牛feeding cattle



能源化

Energy resource

沼气工程
Biogas production



生物质发电
Power generation



秸秆利用方式 Straw utilization

基料化

Base stock



食用菌养殖 Cultivating fungi

原料化

Industry material

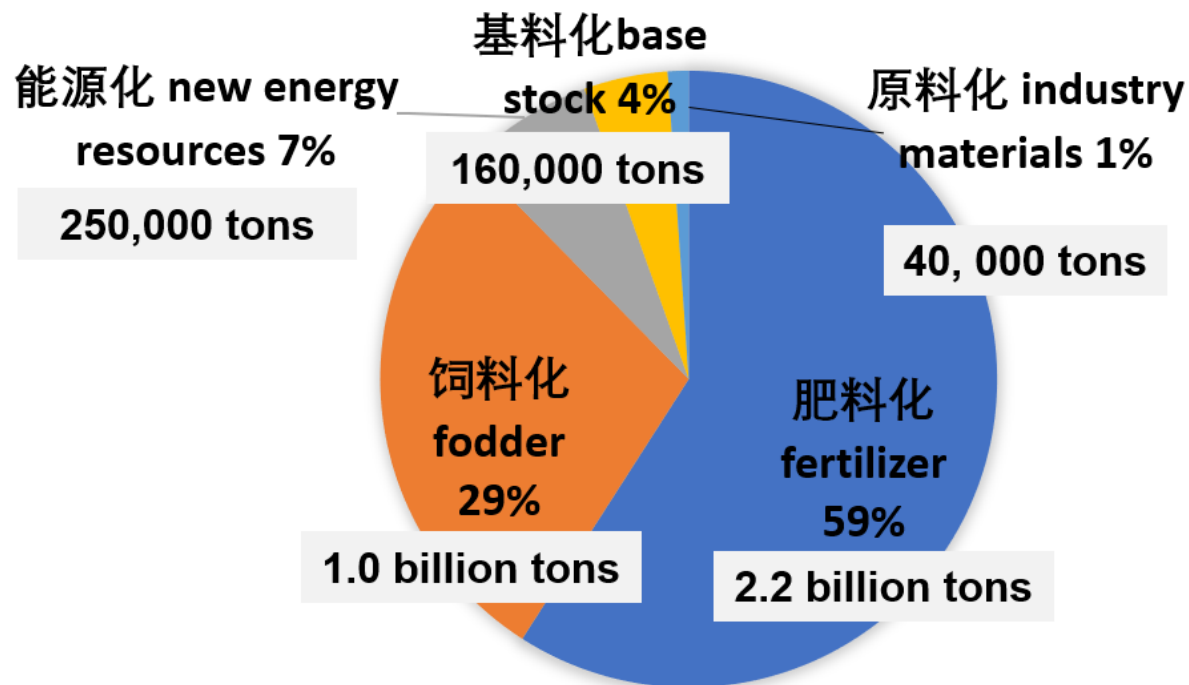


造纸 Papermaking



手工艺品
Crafts production

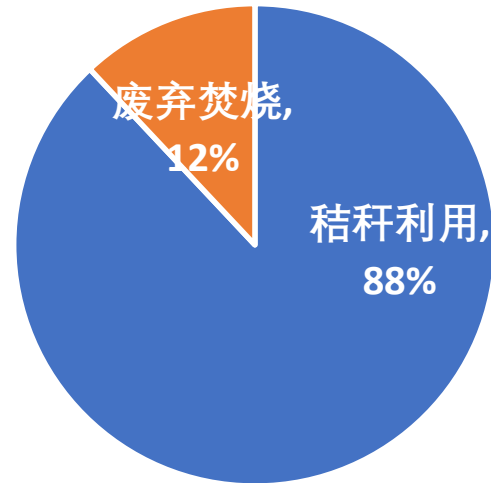
青岛秸秆综合利用 Straw usage in Qingdao



青岛五化利用都有，其中肥料化，饲料化最多，均**大于百万吨**

All 5 straw usage are found, straw used as fertilizer and fodder are the majority and larger than 1 billion tons

莱西秸秆综合利用 Straw usage in Laixi



莱西秸秆综合利用率较高

The ratio of straw integrated utilization in Laixi is high

主要秸秆利用模式包括：秸秆还田，青贮饲料，沼气工程

Main straw utilization patterns: straw returning, ensilage, biogas production

效益评估

Beneficial impacts

经济效益 Economic benefits

➤ 肥料化利用**减少肥料投入**

Save agricultural cost as fertilizer

➤ 饲料化利用**减少饲料投入**

Save agricultural cost as fodder

➤ 提升土壤肥力**增加作物产量**

Increase soil fertility and crop yield

➤ 作为工艺品原材料从而实现增收

Reasonable use of crops straws can enrich the production of raw materials



No	Site	Straw type	Pattern	Economic benefits	Reference
1	Laixi	Wheat	Direct straw returning	Saved chemical fertilizer of 119-149 kg/ha	
2	Jimo	Maize	Ensilage	Increased 180-225 RMB/ha for farmers; Improved milk production and meat yield by 15% and 10%	Dong et al. (2011)
3	Jiaozhou	Potato	Pre-decomposed straw returning	Increased >2.2 t/ha wheat yield	Ren et al. (2017)
4	Jiaozhou	Maize/Wheat	Biological fertilizer	Annual sales of >50 thousand tons biological fertilizer, sales of more than 70 million RMB	Zhu et al. (2009)
5	Laixi	Carrot	Direct straw returning	In 2017, increased yield of 9.7%	Ding et al. (2017)
					Ding et al

The comprehensive utilization of straw can prolong the relevant industries chain, and achieve multiple value-added incomes

秸秆综合利用和延长相关产业链，获得多重效益

10	Laixi	Maize	Ensilage	A cow produced 30 kg/d of milk, annual income was 1.12 billion RMB based on 30 thousand cows	
11	Laixi	Maize	Manure straw returning	Reduced 448-746 kg/ha of chemical fertilizer	
12	Jiaozhou	Wheat	Direct straw returning	Reduced >600 kg/ha chemical fertilizers; increased >1.0 t/ha wheat yield and >3,000 RMB/ha income	Ren et al. (2017)
13	Laixi	Wheat/Maize	Power generation	Qingdao Qiquan biomass power generation annually generated 308 million kWh of electricity and increased income by 100 million RMB	

生态效益 Ecological benefits



改善土壤质量
Improve soil fertility

秸秆中富含丰富的N,P,K元素，可替代部分肥料，增加土壤有机质含量，**提升土壤肥力**

Nutrient resources such as N, P and K are rich in straw.
Increase soil SOC, improve soil fertility



保护环境
Protect environment

秸秆综合利用可提高秸秆利用率，**减少秸秆焚烧**
Increase straw usage, reduce straw burning

秸秆还田可减少水土流失，**减少温室气体排放**
Reduce soil/water lose and GHG emission

秸秆造纸可以保护森林资源

Protect forest resource by papermaking with straw



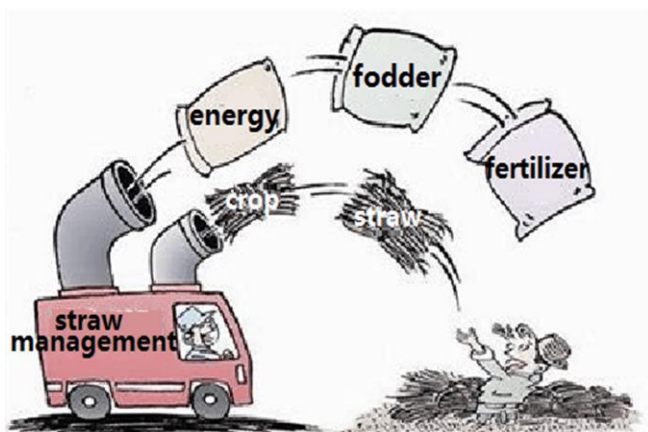
替代不可再生能源

Replace non-renewable resources

可作为原料进行生物发电，**替代不可再生能源**

Used as energy resource, to replace non-renewable resources

社会效益 Social benefits



➤ 增加秸秆资源利用途径

Broaden the channel of straw resource utilization

➤ 助力农业发展，提升农村经济

Promote the development of agriculture and rural economy

项目实施方案

Project strategy

项目目标 Objectives

目标1：调研青岛莱西秸秆综合利用现状

Objective 1: Investigate the status and benefits of integrated straw utilization in Laixi, Qingdao

目标2：筛选适宜的秸秆综合利用技术模式

Objective 2: Select and recommend technical patterns of integrated straw utilization

目标3：建立示范点进行示范推广

Objective 3: Establish demonstration sites of integrated straw utilization in Laixi

目标4：提升当地农民和技术人员水平

Objective 4: Promote technology level of farmers and technicians

项目实施方案 **Project strategy**

1. 调研青岛莱西现有秸秆综合利用模式

Survey on status of integrated straw management in Qingdao

2. 选择适宜的秸秆综合利用模式

Selection of integrating straw utilization pattern

3. 评估并优化秸秆还田技术模式

Analysis and optimization of technical pattern of integrated straw utilization

4. 在莱西进行秸秆综合利用技术示范

Demonstration of integrated straw utilization technical patterns

5. 提升当地农民技术水平

Training of high-efficient and integrated technology for local farmers and technicians

内容一
秸秆综合利用现状调研

Activity 1:
**Status of integrated straw
utilization**

青岛秸秆综合利用现状调研

Survey on status of integrated straw management



文献分析
Literature analysis



实地调研
Field survey

内容二
技术模式筛选

Activity 2:

Selection of technical patterns

技术模式筛选 Selection of technical pattern

- 根据秸秆综合利用现状和效益分析，选择在莱西进行示范

Demonstration at Laixi

- 主要有三化：肥料化、饲料化、能源化示范

Straw used as fertilizer, fodder and new energy resource

1.肥料化 Fertilizer

直接还田 Direct straw returning



秸秆覆盖: 作物收获-秸秆粉碎还田-少免耕播种

Soil cover: Crop harvest→ straw chopping and mulching→ no-till seeding

秸秆混埋: 作物收获-秸秆粉碎抛撒-旋耕秸秆混埋-播种

Straw mixed with soil: Crop harvest→ straw chopping and spreading→ straw mixing → seeding

1.肥料化 Fertilizer

牛粪还田 Cow dung returning



堆肥发酵（添加腐熟剂）→ 撒肥 → 免耕播种
Composting (adding decomposition agent) → fertilizer
spreading → no-tillage seeding

1.肥料化 Fertilizer

沼渣还田 Biogas residues returning



沼渣再次发酵→人工或者机械抛撒→免耕播种
Biogas residues re-fermentation→ manually and
mechanically fertilizer spreading → no tillage seeding

2. 饲料化 Fodder



玉米青贮收获→秸秆储存发酵→喂牛

Maize harvesting→ straw storage and fermentation→ feeding cow

小麦（花生）收获→秸秆储存→搅拌→喂牛

Harvesting→ wheat (Peanut) straws storage→ Mixing→ feeding
COW

3. 能源化 New energy resource

秸秆沼气Biogas



原材料（牛粪）→堆沤发酵→生产沼气→供暖供气
Raw material → composting and fermentation →
produce biogas → heating supply and cooking

4.基料化 Base stock

蘑菇养殖 **Cultivating fungi** 如果资金等支持, if enough budget



材料储存→腐解→发酵→蘑菇种植→管理→采收
Material reserving→ fermentation→ planting →fungi
management → harvest

内容三
技术模式优化

Activity 3:

Optimization of technical patterns

三、技术模式优化 Optimization



田间试验
Field test



调查问卷
Questionnaire

◆经济效益

肥料等投入 Investment

牛奶产量 Milk yield

作物产量 Crop yield...

◆生态效益

有机质含量 SOC content

土壤理化性质 Soil properties...

◆社会效益

秸秆利用率 Straw usage...

◆机具优化

秸秆还田机具 Straw returning machine

牛粪抛撒机 Cattle dung scatter machine...

技术模式优化

内容四
示范

**Activity 4:
Demonstration**

四、技术模式示范 Demonstration



**青岛志涛农机专业合作社 Qingdao Zhitao
Agricultural Machinery Specialized Cooperative**

在莱西建立一个秸秆综合利用示范点

Establish 1 pilot site in Laixi

- 秸秆还田示范田300亩/20ha for straw used as fertilizer
- 牛75头/75 head of cows
- 沼气池600m³/Biogas digester (600m³)

内容五
技术培训

Activity 5:
Technical training

五、技术培训 Technical training



课堂培训
Class training



田间参观
Field tour



讨论
Discussion

提高农民与技术人员技术水平

Improve the technical level of local technicians and farmers
in integrated straw utilization

项目计划 **workplan-** 2018

- **调研青岛秸秆综合利用模式/Survey and selection of integrated straw utilization pattern**
- **研讨会/Workshop**
- **示范点建立/Establishment of demonstration site**

肥料化利用：秸秆直接还田，牛粪还田

Used as fertilizer: Soil cover, cow dung returning to the fields

饲料化利用：青贮玉米

Used as fodder: Ensilage maize

项目计划 **workplan**- 2019

- 技术模式优化（肥料化、饲料化） /Optimizing straw utilization patterns (used as fertilizer and fodder)
- 沼渣还田利用、沼气能源化利用/Biogas residues returning to the fields, Biogas
- 肥料化饲料化能源化示范/Demonstration of straw used as fertilizer, fodder and biogas
- 田间试验/Field testing
- 技术培训/Technical training

项目计划 **workplan**- 2020

- 完善秸秆综合利用技术/Optimize integrated straw utilization patterns
- 技术示范/Demonstration of integrated straw utilization
- 技术培训/Technical training

合作单位 Partners

联合国可持续农业机械化中心
Center for Sustainable Agricultural
Mechanization

项目总体规划
Management and Guiding of the
project

中国农业大学
China Agricultural University

技术研究
Technical research

青岛农机局
Qingdao Municipal Agricultural
Machinery Administration
莱西农机局
Laixi Agricultural Machinery Administration

组织会议、培训、示范
Organizing workshop, technical
training, demonstration

青岛志涛农业合作社
Qingdao Zhitao agricultural machinery
specialized cooperative

示范点
Demonstration site

Thanks !