

## **2022-2023 Guangdong Province's key research and development plan "Food Nutrition, Health and Food Safety" (agricultural product processing) key special application guideline**

Developing agricultural product processing industry is an important starting point for implementing rural revitalization strategy and promoting the integration and development of rural primary, secondary and tertiary industries. In order to implement the strategic plan of rural revitalization of the provincial party committee and the provincial government, ensure the supply and food safety of grain and important agricultural products, launch the 2023 "Food Nutrition, Health and Food Safety" (agricultural product processing) key project, focus on the scientific and technological needs of Guangdong's modern agriculture and food industry clusters, make efforts to tackle key problems of agricultural product preservation and processing, increase the added value of important agricultural products deep processing industry in our province, support the development of prefabricated vegetable industry by science and technology, and promote the healthy development of modern agricultural product processing industry.

There are 7 special projects in this project, and the application method of "competition and merit" is adopted. The project application must cover all the research contents and assessment indicators listed under their respective projects, and carry out technology application and demonstration in Guangdong Province. In principle, one project is supported for the same project. Projects with high evaluation results and different technical routes can be supported in parallel.

**The implementation period is 3 ~ 5 years, and no more than 6 project host institutions.**

### **Keywords:**

1. green preservation technology research
2. litchi high-end food base material manufacturing
3. pineapple precision processing
4. quality improvement and efficiency improvement of melon vegetables after harvest
5. rice storage and processing
6. camellia seed oil processing and product utilization
7. industrialized processing of pre-cooked dishes

**Funding Size:** 4 million yuan – 5 million yuan

**Special Requirement:** Leading or participation by the enterprises is needed.

**Application Time:** December 19, 2022 to January 18, 2023 at 17:00

## **Project 1: Research and demonstration of key technologies of intelligent green preservation for cold storage and transportation of livestock and poultry in Guangdong**

### (1) Research content.

Taking live pigs and chickens as the objects, the key technologies of intelligent green preservation for cold storage and transportation of livestock and poultry were developed, including high-tech cold sterilization and preservation technology, active intelligent antibacterial packaging, high barrier degradable packaging, freshness indication label, modified atmosphere packaging and non-freezing preservation technology of reduced pressure refrigeration. Combined with "fence technology" and HACCP system, the key technical regulations and quality control system for cold storage and transportation of livestock and poultry were formed. Establish a demonstration base for application demonstration and popularization.

### (2) Assessment indicators.

1. R&D a set of integrated intelligent equipment for cold and fresh treatment of livestock and poultry. The transportation quality change rate of livestock and poultry meat products is less than 1%, the loss of flavor substances is less than 10%, the water loss rate is less than 5%, and the elasticity reduction rate is reduced by more than 5%.

2. Develop new fully degradable packaging materials with antibacterial, high barrier and modified atmosphere effects, extend the shelf life of chilled meat for more than 2 ~ 3 days, and have a water retention rate of more than 85%;

3. Research and development of indicator labels that are responsive to the spoilage characteristic molecules of livestock and poultry meat products requires that the detection limit of organic amine, sulfide and other meat spoilage characteristic molecules is lower than 1 $\mu$ mol/L, and the sensitivity is significantly higher than that of existing commercial products; Develop intelligent labels or complete sets of equipment that can monitor the temperature fluctuation in the process of storage, transportation and sales of livestock and poultry meat products. It is required that the cooling time is longer than 15 minutes to give an early warning, and the false alarm rate is less than 1%;

4. Establish 3 ~ 4 demonstration bases for key technologies of intelligent green preservation of livestock and poultry cold storage and transportation, and establish more than 5 demonstration sites for different livestock and poultry breeding and processing enterprises, so that the comprehensive benefits of products can be increased by more than 10%.

### (3) Support methods, intensity and requirements.

1. Support method: Competitive selection.

2. Support intensity: no more than 5 million yuan.

3. Application requirements: the enterprise takes the lead and Industry-University-Research jointly applies.

## **Project 2: Key Technology and Industrialization of Litchi High-end Food Base Material Manufacturing**

### (1) Research content.

Aiming at the problem that litchi is not widely used in the field of food ingredients, which restricts the development of litchi processing industry, this paper makes clear the changing law of the influence of different litchi varieties and different processing methods on some people's inflammatory reactions such as "getting angry", and explores the nutritional and health effects of litchi. Research on the minimum processing technology of litchi, establish key processing technologies and quality control systems for high-quality litchi puree, quick-frozen or canned litchi pulp, litchi fruit powder, lactic acid fermentation prebiotics and other products, research and develop new high-end food base products of litchi, maintain the nutrition, functional ingredients and flavor of litchi to the maximum extent, reduce processing energy consumption, establish demonstration bases for application demonstration and popularization, and realize industrialization demonstration.

### (2) Assessment indicators.

1. Make clear the changing rules of 8 ~ 10 litchi varieties and 3 ~ 4 processing methods such as drying, juice making or lactic acid bacteria fermentation on inflammatory reactions such as "getting angry" caused by litchi in some people;

2. Develop 2 ~ 3 prebiotic ingredients for lactic acid fermentation of litchi, more than 2 new prebiotic products for lactic acid fermentation of litchi juice with an annual output of more than 1,000 tons, and the retention rate of characteristic flavor substances of litchi is more than 30%; Develop 3-5 kinds of stable synergistic emulsion, grading and key preparation technologies of high-quality litchi functional components with independent intellectual property rights.

3. Develop 3 ~ 5 kinds of high-quality litchi food base materials, such as high-quality litchi juice main agent, litchi quick-frozen or canned pulp, litchi fruit powder, etc., formulate technical regulations for product processing, and establish 2 demonstration line production lines to form large-scale production, and reduce processing energy consumption by 30%;

4. The application in large-scale enterprises and more than 2 provincial agricultural science and technology parks or modern agricultural industrial parks can improve the comprehensive benefits of litchi by more than 10%.

### (3) Support methods, intensity and requirements.

1. Support method: Competitive selection.

2. Support intensity: **no more than 4 million yuan.**

3. Application requirements: Joint application by Industry-University-Research.

## **Project 3: Research and demonstration of key technology of pineapple precision processing**

### (1) Research content.

Focusing on the functional characteristics and application direction of pineapple "pulp, skin residue", pineapple pulp is used to develop high-quality fruit powder and fruit juice products, and new catering foods such as cakes and cold drinks based on pineapple fruit powder are developed; Using pineapple peel residue to develop bromelain and fermented products, break through the processing technology of efficiently preparing medical grade bromelain, fruit vinegar, fruit wine and feed from pineapple pomace, and establish the processing technology system of comprehensive utilization of pomace.

### (2) Assessment indicators.

1. The retention rate of polyphenol and vitamin C in pineapple fruit powder and juice is more than 30%, and the retention rate of characteristic flavor substances is more than 20%.

2. The activity of bromelain is more than 120 U/g, and the purity of bromelain is more than 95%.

3. Establish relevant technical regulations or standards for pineapple powder, fruit juice, bromelain and pineapple peel residue products.

More than 4 items, forming more than 5 core intellectual property rights;

4. Establish more than 1 pilot demonstration line of processing technology, develop more than 10 related products, and form large-scale production. The application of technology in agricultural science and technology parks or modern agricultural industrial parks at or above the provincial level will increase the comprehensive benefits of pineapple by more than 10%.

### (3) Support methods, intensity and requirements.

1. Support method: Competitive selection.

2. Support intensity: no more than 5

million yuan

3. Application requirements: the enterprise takes the lead and Industry-University-Research jointly applies.

## **Project 4: Research and industrialization of key technologies for improving quality and efficiency of melon vegetables after harvest.**

### (1) Research content.

Systematically excavate the idiosyncratic components of melon vegetables such as wax gourd, pumpkin, bitter melon and chayote, and construct multidimensional quality evaluation indexes such as taste, nutritional function, processing and safety, so as to clarify the changing rules of characteristic quality formation and maintenance, loss and deterioration in different post-harvest steps. On the basis of moderate processing technology, multi-dimensional and accurate development of high-quality fruit powder, stuffing, fermented drinks and other new products and the establishment of demonstration production lines; Based on the structural characteristics and physical and chemical characteristics of active substances in melons and vegetables, the steady-state utilization technology of active substances was established by chemical and physical modification methods to improve the shelf life of products, keep functional components alive and improve bioavailability, and high-activity extract ingredients were prepared, and industrial demonstration was realized.

### (2) Assessment indicators.

1. Clarify more than 30 idiosyncratic components in melon vegetables, and construct more than 5 characteristic quality evaluation models;
2. Establish five technologies for improving quality and efficiency of melon vegetables after harvest, which can reduce the loss of storage and transportation by 20% and increase the added value of products by more than 30%.
3. Establish more than 2 pilot demonstration lines of processing technology, develop more than 8 new products with high quality, and form large-scale production. The retention rate of main idiosyncratic active ingredients in products is more than 60%;
4. Establish more than 3 related technical regulations or standards, and form more than 5 core intellectual property rights;
5. The application of technology in agricultural science and technology parks or modern agricultural industrial parks above the provincial level can improve the comprehensive benefits of melons and vegetables by more than 15%.

### (3) Support methods, intensity and requirements.

1. Support method: Competitive selection.
2. Support intensity: **no more than 5 million yuan.**
3. Application requirements: the enterprise takes the lead and Industry-University-Research jointly applies.

## **Project 5: Research and development of key technology and equipment for green impairment storage of southern indica rice and precision processing of high-end and high-quality rice.**

### (1) Research content.

In view of the industrial problems in Guangdong, such as high temperature and humidity, large loss of post-harvest storage of rice, difficulty in keeping fresh high-quality rice such as silk seedlings, and shortage of high-end high-quality rice from well-known brands, a technical system for early warning, rapid detection and comprehensive control of stored grain biological hazards was established. Find out the influence of storage conditions on the aging quality of rice, establish a rapid evaluation standard and accurate detection method for the aging quality of stored grain, and develop key technologies and equipment for quality assurance; To explore the influence of different milling and polishing methods and packaging and storage conditions on the quality of different high-quality rice, establish the key processing technology of improving the flavor and cooking and eating quality of southern indica high-quality rice, and break through the bottleneck of difficult preservation in the process of high-quality rice processing, logistics and distribution and terminal storage; Screening the core varieties of high-quality formula rice, creating an intelligent and standardized rice blending model, and developing high-quality rice blending with different uses and taste preferences of people; Establish the whole intelligent management system of southern indica rice warehousing, production, logistics and distribution.

### (2) Assessment indicators.

1. Establish 3 ~ 5 post-harvest loss and quality storage technologies for indica rice, and 1 ~ 2 new technologies for aging characterization and detection. The post-harvest storage loss of indica rice is relatively reduced by more than 10%, and the retention rate of rice storage quality is over 80%.

2. Establish 2 ~ 3 key technologies for processing and preservation of southern indica high-quality rice, build a set of intelligent and standardized rice blending model, develop more than 3 new high-quality rice blending products, increase the added value of products by more than 20%, and form large-scale production, and build 1 ~ 2 famous brand products at or above the provincial and ministerial level;

3. Establish a set of intelligent management system for southern indica rice warehousing, production, logistics and distribution;

4. Technology in more than 5 grain reserve enterprises (libraries) and agricultural science and technology parks at or above the provincial level or modern agricultural industrial parks.

### (3) Support methods, intensity and requirements.

1. Support method: Competitive selection.

2. Support intensity: **no more than 5 million yuan.**

3. Application requirements: the enterprise takes the lead and Industry-University-Research jointly applies.

## **Project 6: Research and development of key technologies and equipment for low-loss processing of camellia seed oil and high-value utilization of byproducts.**

### (1) Research content.

Aiming at the bottleneck problems of single tea oil product, no special technical equipment for processing, low technical level, and no high-value utilization of by-products, the effects of low temperature/suitable temperature pretreatment such as drying, shelling, steaming and frying on the microstructure and processing characteristics of tea seeds were studied, and the key technologies and equipment for tea seed pretreatment in our province were integrated and developed. Develop processing technology and equipment suitable for low-temperature/moderate-temperature pressing and low-loss refining of *Camellia oleifera* seeds, research and develop special high-end tea oil processing technology for special meals and cosmetics, and develop a series of new products such as tea oil special meals and functional cosmetics. Develop key technologies and equipment for high-value utilization of *camellia oleifera* processing by-products such as green extraction and biological fermentation of shell and cake.

### (2) Assessment indicators.

1. Develop a set of integrated pretreatment equipment, establish a new low-loss processing technology of *Camellia oleifera* oil and special food products, more than 2 sets of special high-end tea oil processing technologies and more than 4 new products developed; Integrated pre-development to handle 1 set of equipment and form a large-scale production.
2. R&D one set of high-value utilization technology of *Camellia oleifera* shell, and establish one set of high-efficiency extraction technology of tea oil, tea saponin and polysaccharide in tea seed meal with green solvent, among which the extraction rate of tea saponin is over 90%, and two kinds of green solvents are developed; And form large-scale production; 1 key technology for preparing fermented feed of *Camellia oleifera* seed cake, and 1 set of matching preparation; The comprehensive utilization rate of *Camellia oleifera* seed cake is over 95%.
3. The application and demonstration in agricultural science and technology parks or modern agricultural industrial parks above the provincial level in Guangdong Province has improved the comprehensive benefits of *Camellia oleifera* by more than 10%.

### (3) Support methods, intensity and requirements

1. Support method: Competitive selection.
2. Support intensity: **no more than 5 million yuan**
3. Application requirements: the enterprise takes the lead and Industry-University-Research jointly applies.



## **Project 7: Research on key technology of quality control in industrialized processing of pre-cooked dishes and industrialization demonstration.**

### (1) Research content.

Based on the data of quality, nutrition, storage and processing characteristics and characteristic flavor components of prepared vegetable raw materials of Lingnan characteristic agricultural products, this paper provides a reference for the selection of prepared vegetable raw materials, the excavation of new nutrition and functional components, and the establishment of food safety traceability system. In view of the "over-cooked taste" of cooked poultry and poultry products in the process of sterilization, storage, transportation and reheating in Lingnan, the control technologies such as anti-oxidation and flavor blocking and masking were established, and the key technologies such as the formation mechanism of quality and flavor, fidelity control and recovery degree were studied, and the industrialized application of cooked vegetables was carried out. Aiming at the fishy smell problem of aquatic prefabricated vegetables, metabonomics technology was used to analyze the difference of flavor transformation during processing, to clarify the different flavor compounds and their metabolic pathways, and to establish the key technologies of controlling, masking and seasoning fishy smell substances of aquatic prefabricated vegetables, and industrialized demonstration of quality control technology of related prepared vegetables. This paper studies the changing law of the quality of prepared vegetable products during processing, adopts new processing technology, strengthens the compatibility of nutritional functions, and forms an all-round, three-dimensional and multi-dimensional quality assurance system around the key points of quality and safety control in the whole process of processing, storage, transportation and sales, and formulates the quality and processing standards of prepared vegetable products.

### (2) Assessment indicators.

1. Establish a database of famous aquatic products or livestock and poultry prefabricated dishes in our province;
2. Establish 1 ~ 2 key technologies for controlling over-cooked taste of livestock and poultry prefabricated vegetables and 1 ~ 2 key technologies for controlling fishy smell of aquatic prefabricated vegetables;
3. Formulate 2 ~ 3 standards for the production, quality and safety of prepared vegetable products, and form 1 ~ 2 kinds of quality assurance systems for prepared vegetable products;
4. Develop more than 5 prefabricated vegetable products, form large-scale production, and demonstrate their application in agricultural science and technology parks or modern agricultural industrial parks above the provincial level in Guangdong Province. The comprehensive benefits of the main raw materials of prefabricated vegetables have increased by more than 10%.

### (3) Support methods, intensity and requirements.

1. Support method: Competitive selection.
2. Support intensity: **no more than 5 million yuan.**
3. Application requirements: Joint application by Industry-University-Research

