

Development of the Soft Canned Taro (*Colocasia esculenta*)

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Abstract: Canned taro (*Colocasia esculenta*) products on the market are tins with large capacity, which are difficult to carry. In order to develop a convenient and edible soft canned product of taro, the optimum formula of soft canned taro was studied by single factor and orthogonal test with sensory score and soluble solids content as indicators in this experiment. The same formulation technology was used to make soft canned taro and glass canned taro, and the two cans were compared with commercially available canned tinplate taro products. The results showed that the formulation technology of soft canned taro was as follows: with the addition of 0.6% honey, the solid-liquid ratio was 2.00:1, the sugar addition was 24% and the salt addition was 0.15%. The sensory evaluation of three kinds of canned taro was carried out by the method of fuzzy comprehensive evaluation. According to the comprehensive sensory evaluation, physical and chemical indexes and microbial indexes, the soft canned taro had the best sensory evaluation. Most of the other physical and chemical indexes were better than glass canned and tinplate canned, and reaches the commercial sterilization standard. The research on the processing conditions of soft canned taro provides a theoretical basis for the development of related products of taro.

Keywords: *Colocasia esculenta*, Soft Canned, Formulas, Fuzzy Comprehensive Evaluation

1. Introduction

Taro (*Colocasia esculenta*) belongs to the genus Araceae [1], which is spherical in shape and has very clear purple-red markings. It is a common rhizome economy in tropical humid areas such as Guangxi and Fujian. Taro is a traditional famous brand product in Hezhou, which is sold well in Guangxi and Guangdong with its "taste, quality and crispy". Taro is rich in nutrition, color, aroma and taste. The main food of taro is corm, which contains rich starch, protein, dietary fiber, vitamins and minerals and so on [2]. Its taste is soft, sweet and glutinous, and its nutritional value is similar to that of potatoes, but it does not contain Solanin [3]. It not only has nutritional and healthy function, but also is people's favorite food [4].

Most of the canned taros currently on the market are large-capacity tinplate cans, and tinplate cans take longer to reach

the sterilization temperature during sterilization, which will make the food darker [5]. However, the small size of soft cans and the thin composite film used, the time to reach the sterilization temperature in the center of cans is shorter than that of tinplate, which can maintain good color, aroma, taste and nutrition [6]. And the soft canned products have many advantages, such as simple production process, low cost, easy to carry, easy to eat and so on, and have a broader market prospects.

In this experiment, the soft canned taro with unique flavor and easy to eat was developed. It can be used as a leisure food for the public to eat directly, and can also be used as an ingredient to make a variety of simple taro series food, thus promoting taro into the market and facing consumers.

2. Materials and Methods

2.1. Materials

Taro, honey, sugar and salt were provided by Baijiafu supermarket in Hezhou, Guangxi; Retort Pouch (PA+CPP) was purchased from Shijiazhuang Xilong Packaging Co., Ltd; Canned taro for comparison was purchased from Guangzhou Tiancong Food Co., Ltd; Food-grade calcium chloride was purchased from Henan Shengside Industrial Co., Ltd; Copper sulfate, Potassium sulfate, 95% Ethanol, Crystal violet, Ammonium oxalate, Methyl red and Bromocresol green were purchased from Guangdong Guanghua Technology Co., Ltd.; Sodium hydroxide and Sulfuric acid were purchased from Xilong Science and Technology Co., Ltd.. All chemical reagents were AR pure.

CR-400 color difference meter was purchased from Konica Minolta (China) Investment Co., Ltd; PTX-FA110S electronic balance was purchased from Fuzhou Huazhi Scientific Instruments Co., Ltd; AS-ZOL vacuum packaging machine was purchased from Quanzhou Ansen Mechanical and Electrical Co., Ltd; FE28 pH meter was purchased from Mettler-Toledo Instruments (Shanghai) Co., Ltd; LH-B55 digital refractometer was purchased from land. Evergreen Biotechnology Co., Ltd; YXQ-LS-50S11 vertical pressure steam sterilizer and ZD-85 Gas Bath Constant Temperature Oscillator was purchased from Shanghai Boxun Industrial Co., Ltd. Medical Equipment Factory; TA. XT Plus Physical Property Tester was purchased from Stable Micro System Ltd, UK; ATN-300 Automatic Kjeldahl Nitrogen Determiner and KDN-08D Constant Temperature Heating and Cooking Furnace was purchased from Shanghai Hongji Instruments and Equipment Co., Ltd., the HH-S2 digital display constant temperature water bath pot was purchased from Jiangsu Jinyi Instrument Technology Co., Ltd., and the BA210 biological microscope was purchased from Motic China Group Co., Ltd.

2.2. Soft Canned Taro Processing

Material selection → Cleaning → Peeling → Cutting → Hardening → Pre-cooking → Cooling and draining water → Seasoning → Bagging and sealing → Exhaust → Sterilization → Cooling → finished product → quality inspection

2.3. Experimental Design

According to the process of making soft canned taro, refer to the method of Lou Wenjuan [7] slightly modified, because honey can inhibit PPO activity, can inhibit the browning effect [8], although honey is easy to change after heating, but the fructose and Glucose [9] can bring a good taste to the soup. A small amount of salt can protect the color of the product, and a proper amount of salt combined with sugar can enhance the flavor of the product. Therefore, according to the preliminary test results, the ratio of the taro and the sauce were selected to be 0.5:1, 1:1, 1.5:1, 2:1 and 2.5:1; The

amount of white sugar added were 16%, 20%, 24%, 28% and 32%; The amount of honey added were 0.2%, 0.4%, 0.6%, 0.8% and 1%; The amount of salt added were 0.05%, 0.1%, 0.15%, 0.2% and 0.25% were tested for single factor test. The soluble solids and comprehensive sensory scores were used as indicators to study the effects of various factors on the quality of soft canned taro.

2.4. Determination of the Optimum Technological Conditions of Soft Canned Taro

On the basis of single factor test, in order to further study the optimum processing conditions of soft canned taro, that the orthogonal experiment was designed with three factors: solid -liquid ratio, the addition of sugar and salt. Orthogonal test factors and levels were shown in Table 1.

Table 1. Orthogonal test factor level.

Level	Factor		
	A Solid -liquid ratio/(g/mL)	B Sugar addition/%	C Salt addition/%
1	1.75:1	22	0.13
2	2.00:1	24	0.15
3	2.25:1	26	0.17

2.5. Contrast Test

The sensory evaluation of three kinds of canned taro was carried out by the method of fuzzy comprehensive evaluation, Physicochemical (Chroma, Hardness, pH, Total solid, Soluble solids and Protein) and microbial (Commercial sterilization) indexes were detected. The same formulation technology was used to make canned taro glass. The soft canned taro, glass canned taro and tinplate canned taro products were compared.

2.6. Determination of Indicators

Method for determination of the total solid reference national standard GB/T 10786-2006; The pH reference national standard GB/5009.237-2016; The protein content reference national standard GB/5009.5-2016; Soluble solids were measured by a refractometer [10]. The L* (brightness), a* (red-green) and b* (yellow-blue) were measured by the color difference meter measures and calculate ΔE ; The hardness was measured by a physical property meter TA. XTPLUS; The sensory evaluation of soft canned taro was carried out from four aspects: color, taste and smell, soup, shape. The soft canned taro sauce was prepared by comprehensive scoring method [11], and the three kinds of canned taros were compared by the fuzzy comprehensive evaluation method respectively [12, 13]. The method was to select 10 people to evaluate and grade the soft canned taro. The specific scoring criteria are shown in Table 2.

Table 2. Test criteria for sensory evaluation of soft canned taro.

Project	weight	Grading	score	
Color	0.2	The taro cubes are bright and shining in color, partly purple	16~20	Excellent
		The taro cubes are slightly discolored, yellowish	12~15	Medium
		The taro cubes are heavily discolored and turns brown	<12	Poor
Taste and smell	0.4	It tastes great and has a distinct aroma of taro and honey syrup.	32~40	Excellent
		Taste incongruous, but slightly sour or sweet or salty, taro taste is not obvious, honey and syrup taste is heavy, has a slightly bad taste.	24~31	Medium
		Taste incongruous, and taste serious acidic or sweet or salty, no taro taste, only honey and syrup taste, has a bad taste.	<24	Poor
Soup	0.1	The soup is clear and transparent, and contains no taro crumbs.	8~10	Excellent
		The soup is slightly opaque, with a small amount of taro that does not cause turbidity.	6~7	Medium
		The soup contains a large amount of taro crumbs and causes turbidity.	<6	Poor
Shape	0.3	The taro has appropriate hardness and complete cubes shape.	24~30	Excellent
		The taro cubes are slightly soft or hard, and the cubes shapes in the package are mostly intact.	18~23	Medium
		The taro cubes are too soft or too hard, and the cubes shaped in the package are loose.	<18	Poor

3. Results and Analysis

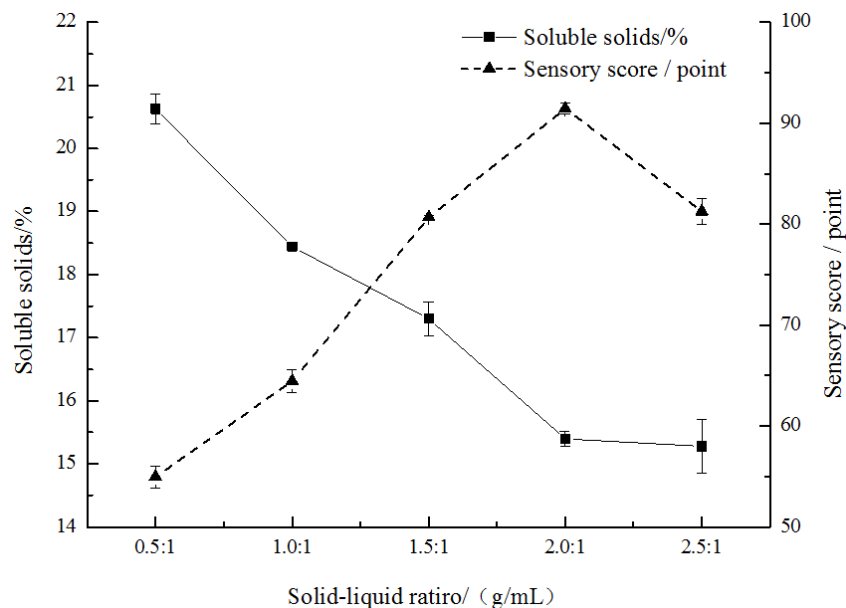
3.1. Effect of Different Solid-liquid Ratio on Quality of Soft Canned Taro

Different solid-liquid ratio had different effects for soft canned taro of color, Taste and smell, Soup, and Shape. It reflected in Figure 1, suitable solid-liquid ratio could make soft canned taro preserve its cubes shape integrity through vacuum packaging, but with the increase of the proportion of condiment juice, the soft canned taro cubes will become more and more soft and loose. The aroma of taro gradually declined and was replaced by the taste of honey or syrup. When the ratio of solid to liquid was 2:1, the taro cubes were bright and shining in color, it tastes great and had a distinct aroma of taro and honey syrup. The soup was clear and transparent, without taro crumbs, with moderate hardness and intact cubes shape in the package. When the ratio of solid to liquid was 2.5:1, the flavoring juice in soft canned taro was the least, and the taro lump was easy to coke because of high

temperature, which made the color of taro lump brown. When the ratio of solid to liquid was 0.5:1 and 1:1, the soft canned taro was too sweet, yellowish in color, loose in lump, with the lowest sensory score and unacceptable taste.

The Soluble Solids was an important index for evaluating canned cans. Figure 1 shows that with the solid-liquid ratio from 0.5:1 to 2.5:1, the soluble solids gradually decrease. The mainly reason was the content of honey syrup decreases with the ratio of material to liquid changing, resulting in the decrease of the total soluble solids in soft canned taro. However, the national standard GB/T 7098-2015 has no requirement on Soluble solids in soft canned taro, but in the textbook "Storage and Processing of Fruits and Vegetables", the requirements for soluble solids in canned sugar, fruit and vegetable are usually within the range of 8%-22% [15]. Soluble solids could be used as a reference for orthogonal test screening.

Comprehensive sensory evaluation and soluble solids, the solid-liquid ratio of soft canned taro were 1.75:1, 2.00:1 and 2.25:1 as the screening level of orthogonal test.

**Figure 1.** Effect of different solid-liquid ratio on quality of soft canned taro.

3.2. Effect of Different Sugar Additions on the Quality of Soft Canned Taro

Adding sugar can improve the taste of soft canned taro [16]. The sweetness of soft canned taro varies with the amount of sugar. It reflected in Figure 2, the sensory score increases with the increase of sugar content, but beyond a certain limit, the sensory score decreases greatly. The sweetness of soft canned taro was acceptable to most people with 24% sugar content, which made the taste of taro and syrup coordinated, and the sensory score was the highest. However, when the sugar content exceeds 28%, it was too sweet and the sweetness was unacceptable to most people. When the sugar concentration was too much, the maillard

reaction will occur in the sterilization process, resulting in yellowish overall color of soft canned taro [17], so the sensory score was low.

It can be seen from Figure 2 that the soluble solids of soft canned taro increase with the addition of white sugar, because the increase of sugar concentration leads to an increase in the refractive index of soft canned syrup, and soluble solids in the range of 8% ~22%. However, the soluble solids content in soft canned taro cannot be increased only by increasing sugar, which will increase the sweetness of soft canned taro and lead to the decrease of sensory score.

Comprehensive sensory evaluation and soluble solids, the sugar additions of soft canned taro were 22%, 24% and 26% as the screening level of orthogonal test.

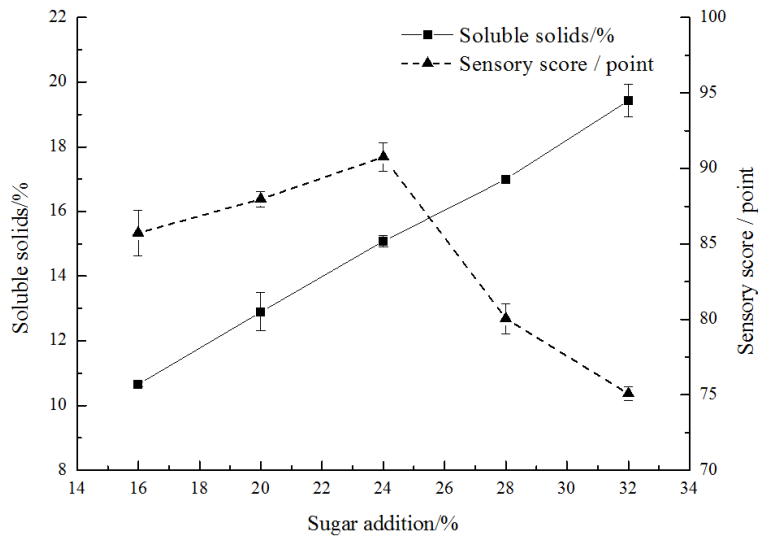


Figure 2. Effect of different sugar additions on the quality of soft canned taro.

3.3. Effect of Different Honey Additions on the Quality of Soft Canned Taro

Adding honey could increase the flavor of soft canned taro and coordinate the sauce with taro. It could increase the content of soluble solids without too sweet. Figure 3 shows

that when honey was added more than 1%, the soft canned taro will be yellowish, so the sensory score was low. Adding 0.4% and 0.6% honey could make the soft canned taro had better flavor, but the sensory difference was not obvious, but people cannot feel the obvious difference.

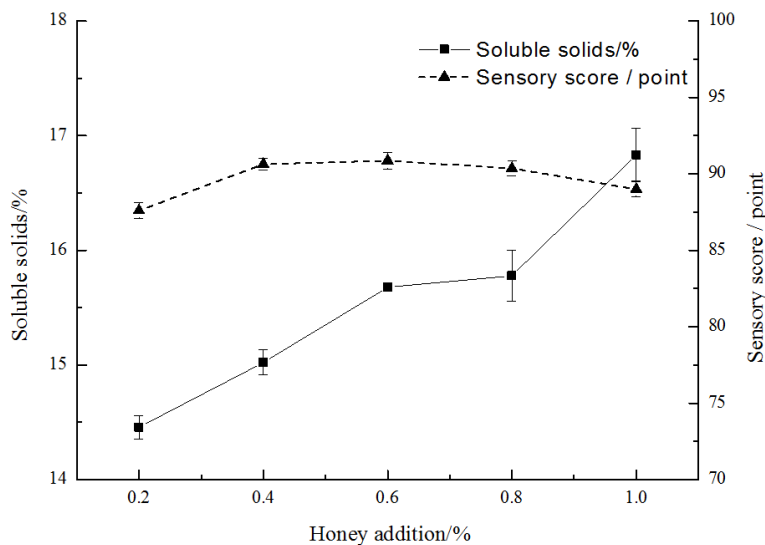


Figure 3. Effect of different honey additions on the quality of soft canned taro.

It can be seen from Figure 3 that soluble solids in soft canned taro increased with the increase of honey content, because honey contains fructose and glucose. With the increase of honey concentration, the refractive index of sauce increased in the range of 8%-22%. However, there was no significant difference in sweetness by sensory evaluation, and there was no significant difference in sensory score.

Comprehensive sensory evaluation and soluble solids, in order to improve the content of soluble solids in soft canned taro, 0.6% honey addition was selected for orthogonal test, but it was not the factor of orthogonal test.

3.4. Effect of Different Salt Additions on the Quality of Soft Canned Taro

Salt could improve the taste of soft canned taro, so that the sauce will not be too sweet [18]. Figure 4 shows that the

sensory score increased with the increase of salt addition in the appropriate range of salt concentration. When the salt addition was 0.15%, the soft canned taro had the most harmonious flavor and the best taste. If the salt addition was less than 0.05%, it will feel too sweet without salty taste. And because people's acceptance of salty taste was very poor, they had a strong ability to perceive. As long as the salt addition exceeds 0.25%, the sensory evaluator tastes too salty and feels bad.

It could be seen from Figure 4 that with the increase of salt addition, the refractive index of sauce increased in the range of 8%-22%. But because the amount of salt added was too small, it had little effect on soluble solids.

Comprehensive sensory evaluation and soluble solids, the salt additions of soft canned taro were 0.13%, 0.15% and 0.17% as the screening level of orthogonal test.

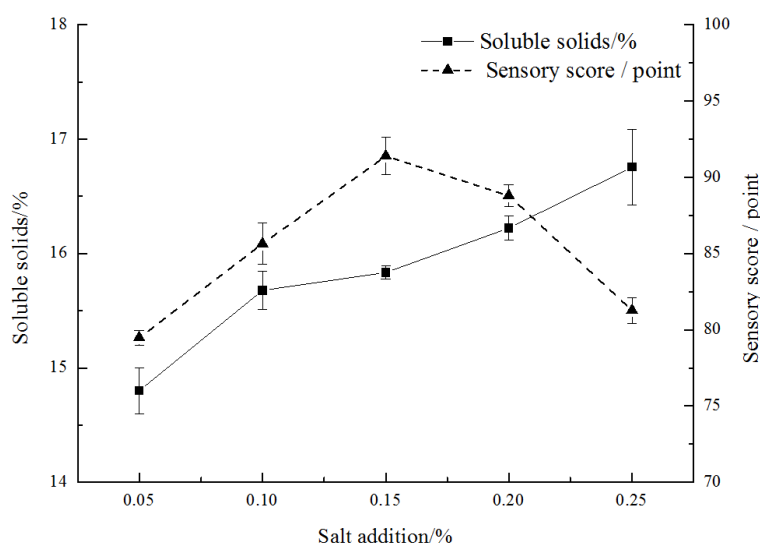


Figure 4. Effect of different salt additions on the quality of soft canned taro.

3.5. Orthogonal Test Results

According to the results of single factor test, it was concluded that the solid-liquid ratio, sugar and salt additions had great influence on the sensory quality of soft canned taro. Therefore, orthogonal experiments were carried out to optimize the processing technology of soft canned taro. The results are shown in Table 3.

Table 3. Orthogonal test results of soft canned taro.

Test number	Test factor				Sensory score/point	Soluble solids/%
	A Solid -liquid ratio/(g/mL)	B Sugar addition/%	C Salt addition/%	Blank column		
1	1 (1.75:1)	1 (22%)	1 (0.13%)	1	80.63	15.21
2	1	2 (24%)	2 (0.15%)	2	82.57	16.57
3	1	3 (26%)	3 (0.17%)	3	77.90	17.35
4	2 (2.00:1)	1	2	3	88.75	14.78
5	2	2	3	1	90.80	15.46
6	2	3	1	2	83.97	16.13
7	3 (2.05:1)	1	3	2	84.53	14.29
8	3	2	1	3	87.53	14.61
9	3	3	2	1	83.23	15.18
K ₁	241.10	253.92	252.13	254.67		
K ₂	263.52	260.90	254.55	251.07		
K ₃	255.30	245.10	253.23	254.18		
k ₁	80.37	84.64	84.04	84.89		
k ₂	87.84	86.97	84.85	83.69		

Test number	Test factor				Sensory score/point	Soluble solids/%
	A Solid -liquid ratio/(g/mL)	B Sugar addition/%	C Salt addition/%	Blank column		
k ₃	85.10	81.70	84.41	84.73		
R ₁	7.47	5.27	0.81			
Factor primary and secondary			A>B>C			
Optimal combination			A ₂ B ₂ C ₂			
K ₁	49.13	44.28	45.95	45.86		
K ₂	46.37	46.63	46.53	46.99		
K ₃	44.08	48.67	47.11	46.73		
k ₁	16.38	14.76	15.32	15.29		
k ₂	15.46	15.54	15.51	15.66		
k ₃	14.69	16.22	15.70	15.58		
R ₂	1.68	1.46	0.39			
Factor primary and secondary			A>B>C			
Optimal combination			A ₁ B ₃ C ₃			

From the range R value of Table 3, it could be concluded that the solid-liquid ratio, the sugar and salt additions had effect on the quality of soft canned taro. The order of influence was: A (solid -liquid ratio) > B (sugar addition) > C (salt addition). That was, the most significant factor affecting the sensory evaluation and soluble solids of soft canned taro was the ratio of material to liquid, while the salt content had the least significant effect. The optimum sensory evaluation process was A₂B₂C₂, which indicated that the solid -liquid ratio was 2.00:1, the sugar addition was 24%, and the salt addition was 0.15%. The optimum process of soluble solids was A₁B₃C₃, which indicated that the solid -liquid ratio was 1.75:1, the sugar addition was 26%, and the salt addition was 0.17%. Table 3 shows that the orthogonal test results of soluble solids are in the range of 8%~22%. Therefore, sensory evaluation was selected as the main evaluation index for soft canned taro.

3.6. Verification Test Results

The optimal A₂B₂C₂ test group was compared with the highest sensory score A₂B₂C₃ test group in the orthogonal test table, and the validation test was carried out on the premise of 0.6% honey addition. The results are shown in Table 4.

Table 4 shows that the sensory score of the experimental

group of A₂B₂C₂ optimized by validation test is 92.33, which is higher than that of the experimental group of A₂B₂C₃ orthogonal test, and the soluble solids are in the range of 8%-22%. The results showed that the optimum technological combination by orthogonal test was more reliable, so the final technological conditions of soft canned taro were as follows: A₂B₂C₂, with the addition of 0.6% honey, the solid -liquid ratio was 2.00:1, the sugar addition was 24% and the salt addition was 0.15%.

Table 4. Verification test of soft canned taro.

Test plan	Sensory score/point	Soluble solids/%
A ₂ B ₂ C ₃	89.77	15.92
A ₂ B ₂ C ₂	93.07	15.78

3.7. Comparative Test Results

The soft canned taro, glass canned taro and tinsplate canned taro products were compared.

3.7.1. Fuzzy Comprehensive Evaluation Results

The sensory indexes of three kinds of canned taro were synthetically evaluated by the method of fuzzy comprehensive evaluation. The evaluation results are shown in Table 5.

Table 5. Comparison of sensory evaluation of canned taro (Unit: Number).

Canned taro types	Test factor	Excellent	Medium	Poor
(A) Soft canned	Color	8	2	0
	Taste and smell	9	1	0
	Soup	7	3	0
	Shape	9	1	0
(B) Glass canned	Color	0	4	6
	Taste and smell	3	4	3
	Soup	2	2	6
	Shape	9	1	0
(C) Tinsplate canned	Color	0	6	4
	Taste and smell	0	3	7
	Soup	0	8	2
	Shape	6	4	0

Table 5 shows that, taking the color of soft canned taro as an example, 8 people give excellent evaluation, 2 people give middle evaluation and 0 people give poor evaluation. In order to obtain the fuzzy matrix of A, B and C for different types of canned taro, the number of the number of people who agree

with the sensory evaluation grades were divided by 10, and the comprehensive evaluation sets Y_A, Y_B and Y_C of the fuzzy relationship were calculated according to the weight of each factor.

$$Y_A = \{0.2, 0.4, 0.1, 0.3\} \cdot \begin{bmatrix} 0.8 & 0.2 & 0.0 \\ 0.9 & 0.1 & 0.0 \\ 0.7 & 0.3 & 0.0 \\ 0.9 & 0.1 & 0.0 \end{bmatrix}$$

$$Y_B = \{0.2, 0.4, 0.1, 0.3\} \cdot \begin{bmatrix} 0.0 & 0.4 & 0.6 \\ 0.3 & 0.4 & 0.3 \\ 0.2 & 0.2 & 0.6 \\ 0.9 & 0.1 & 0.0 \end{bmatrix}$$

$$Y_C = \{0.2, 0.4, 0.1, 0.3\} \cdot \begin{bmatrix} 0.0 & 0.6 & 0.4 \\ 0.0 & 0.3 & 0.7 \\ 0.0 & 0.8 & 0.2 \\ 0.6 & 0.4 & 0.0 \end{bmatrix}$$

That is $Y_{A1}=(0.2 \wedge 0.8) \vee (0.4 \wedge 0.9) \vee (0.1 \wedge 0.7) \vee (0.3 \wedge 0.9) = 0.2 \vee 0.4 \vee (0.1 \vee 0.3) = 0.4$. Similarly, $Y_{A2}=0.2$, $Y_{A3}=0.0$. $Y_A = \{0.4, 0.2, 0.0\}$, normalized $Y_A = \{0.67, 0.33, 0.00\}$. The peak value of the comprehensive evaluation of fuzzy relationship is 0.67, and $Y_{A1} > Y_{A2} > Y_{A3}$, which shows that 67% of the people approve of the excellent evaluation of soft canned taro. Therefore, the comprehensive evaluation grade of soft canned taro was excellent.

$Y_{B1}=0.3$, $Y_{B2}=0.4$, $Y_{B3}=0.3$, $Y_B = \{0.3, 0.4, 0.3\}$, normalized $Y_B = \{0.3, 0.4, 0.3\}$. The peak value of the comprehensive evaluation of fuzzy relationship is 0.4, and $Y_{B2} > Y_{B1} = Y_{B3}$, which shows that 40% of the people approve of the medium evaluation of glass canned taro. Therefore, the comprehensive evaluation grade of glass canned taro was medium.

$Y_{C1}=0.3$, $Y_{C2}=0.3$, $Y_{C3}=0.4$, $Y_C = \{0.3, 0.3, 0.4\}$, normalized $Y_C = \{0.3, 0.3, 0.4\}$. The peak value of the comprehensive evaluation of fuzzy relation is 0.4, and $Y_{C3} > Y_{C1} = Y_{C2}$, which shows that 40% of the people approve of the poor evaluation of tinfoil canned taro. Therefore, the comprehensive evaluation grade of tinfoil canned taro was poor.

The comprehensive evaluation results were multiplied by their corresponding scores (excellent 100 points, medium 80 points and poor 60 points) and added to get the final fuzzy evaluation score, as shown in Table 6.

Table 6. Summary score of fuzzy evaluation.

Canned taro types	Fuzzy evaluation score/point
(A) Soft canned	93.33
(B) Glass canned	80.00
(C) Tinplate canned	78.18

Table 6 shows that the soft canned taro blocks optimized by processing technology were bright in color and unique in flavor, it had a distinct aroma of taro and honey syrup, the soup was clear and transparent without taro crumbs, and the taro had appropriate hardness and complete cubes shape. So the fuzzy evaluation score was the highest.

The glass cans made by similar technology of soft canned taro were complete in shape. After high temperature sterilization, the canned taro had serious browning and bad taste because of less sauce. So the fuzzy evaluation score was 80.00.

Tinplate canned taro was the sweetest products, which made people feel sugary. There were too much soup juice and a lot of taro crumbs, which cause turbidity. But the taro crumbs were relatively complete. Because they were too sweet to be eaten directly, the fuzzy evaluation score was the lowest.

3.7.2. Physicochemical Indexes Text Results

The physicochemical indexes of different kinds of canned taro were tested and compared. The results are shown in Table 7. Table 7 shows that the following results are obtained from the analysis of physical and chemical experiments. (1) The ΔE of soft canned of taro was the smallest, that was the color difference between fresh-cut taros and soft canned of taro were the smallest. The ΔE of glass canned taro was slightly larger than tinplate canned taro, but the value of a^* , b^* of tinplate canned taro was the largest, indicating that the fragrant taro in the cans was seriously yellow and reddish. (2) The hardness of tinplate canned taro was larger than that of soft canned and glass canned. Because of the large size of taro cube, tinplate canned taros were not easy to soften after cooking at high temperature. However, all canned taros had complete block shape and acceptable hardness. (3) Three kinds of canned taro's pH > 4.6 indicated that they belonged to low acid food [19]. (4) The content of total solid in soft canned taro and glass canned taro was above 90%, and the content of total solid in tinplate canned taro soup was the lowest. (5) Soluble solids in the soft canned taro and the glass canned taro were in the range of 8%~22%, but the tinplate canned was 23.93%. Because the tinplate canned ingredient list shows that only white sugar was added to the production, too much sugar leads to larger soluble solids, which will lead to too sugary and the sensory score decline. (6) The protein content of three kinds of canned taro was similar, but low. The reason was that the high temperature made the protein denatured and inactivated, and protein content decreases.

Table 7. Comparison of physicochemical indexes of canned taro.

Physicochemical index	(A) Soft canned	(B) Glass canned	(C) Tinplate canned
L*	57.15	53.03	55.96
a*	1.71	5.69	10.66
b*	10.32	10.28	17.38
ΔE	31.33	35.79	34.54
Hardness/N	0.57	0.69	1.00
pH	6.08	6.19	5.86
Total solid/%	95.26	93.04	74.00
Soluble solids/%	15.80	14.10	23.93
Protein/(g/100g)	0.60	0.63	0.54

3.7.3. Commercial Sterilization Results

Three kinds of canned taro were preserved at 37°C for 10 days and tested for commercial sterilization. There was no obvious phenomenon of bag opening and canning swelling. There was no obvious colonial proliferation in smear microscopy, and the change of pH was less than 0.5. The results showed that they all met the commercial sterilization standard of canned taro.

4. Conclusion

In this experiment, the processing technology of soft canned taro was studied, and a new technology of soft canned taro was put forward. A new type of soft canned taro products was developed with delicious taste unique, convenient to eat. The results showed that the formulation technology of soft canned taro was as follows: the addition of 0.6% honey, the solid-liquid ratio was 2.00:1, the sugar addition was 24% and the salt addition was 0.15%. The comprehensive evaluation grade of soft canned taro processed with the optimum technological conditions was excellent, and the fuzzy evaluation score was 93.33. The sensory evaluation of soft canned taro was the best through comparative experiments. The physicochemical indexes of soft canned taro were mostly better than glass canned and tinplate canned, met the commercial sterilization standard. The research provides a theoretical basis for the development of taro and soft canned products. On the basis of this experiment, there are still many contents to be further studied. In this experiment, sweet taro soft cans are studied, and different flavors of soft can taros can also be studied. This experiment uses transparent retort pouch, and the quality of soft cans made of different packaging materials will be different after sterilization and during storage. So we can use different materials of high temperature cooking bags, such as opaque aluminum foil materials, to study the impact of different packaging materials. In this experiment, taro with less dosage is made into soft cans. In actual production, it is necessary to study the influence of different loading amount and adjust sterilization temperature and time. In addition, the shelf life of the product and the changes in physical and chemical indicators, sensory indicators and microbial indicators during storage need further study.

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