SPECIFICATION

# A PROCESS FOR PRODUCING A READY-TO-EAT (RTE) ADLAI (*Coix-lacryma-jobi L.*) PORRIDGE

## TECHNICAL FIELD

The present utility model generally relates to food production processes but more particularly to a process for producing a ready-to-eat (RTE) adlai porridge.

## BACKGROUND OF THE UTILITY MODEL

Adlai (*Coix-lacryma-jobi L.*) plant, also known as Job's tear or Chinese pearl barley yield grains being referred to as adlai. Adlai is an alternative staple food for the popular padded rice (*Oryza sativa*) and corn (*Zea mays*) or maize. Adlai carries nutritional significance due to its low glycemic index and high protein contents compared to other crops. It is being compared to high valued crops like quinoa based on nutritional benefits but with lesser cost. As reported, adlai contains 50% starch, 14% protein and 6% fat (FAO, 2012). Adlai is underutilized because most Filipino consumers are not yet familiar with its ramous food applications and health benefits. The crop is being promoted by the Department of Agriculture (DA) as an alternative source of healthy staple food.

To familiarize Filipino consumers, the most popular rice-based products will be used as benchmark in the formulation of adlai-based products. Among the products identified is the Adlai porridge. The developmental stage will focus on enhancing the acceptability of adlai-based products in terms of flavor/taste and texture. For adlai, the crop requires an appropriate processing and packaging technologies that will increase its commercial value and acceptability to Filipino consumers. Adlai has lesser acceptability compared with rice based on the previous studies conducted by Dela Torre (2018) and Mamucod et al. (2020). Researchers are continuously conducting research to use adlai as an alternative staple food not only because it could reduce the country's dependency on crops with high environmental impact like rice and corn but most importantly for its nutritional value. Currently, more farmers

are planting adlai and the demand for the crop is increasing. Adlai can be seen in the market in grit or grain form.

During the 2021 ENNS National Dissemination of DOST-FNRI, it was presented that 36.4% of Filipinos ages 20 and above have prevalence of impaired fasting glucose and another 8.1% with high fasting blood sugar. This accounts of about 30 million Filipinos based on the 68 million population of Filipinos under the age group. There is also 14.4% prevalence of elevated blood pressure among adults ages 20 to 59 and 33.4% to 60 years and above. Adlai will be an attractive product for these niche market as it has lower glycemic index compared to rice (Meng-Hsueh et al., 2010), and as compared earlier it has cheaper price than the imported quinoa. Adlai has also higher protein content when compare to rice and corn which are suitable to the work activities of military and police personnel which can be considered in addition to the target market.

Coupling the properties of adlai as good staple food with an appropriate packaging technology will be an effective approach to capture the niche market. Development of new adlai products using retort pouch packaging technology is one of the technologies to produce RTE meals which is expected to reach USO 2,023.2 million by 2028 (6Wresearch, 2023). This technology uses retort pouch that can withstand thermal processing, and retort chamber with counter pressure. Requirements for the technology are available in the country and feasible for companies to expand production to serve the niche market. The technology does not just promise product protection but as well as bringing adlai to be positioned in a competitive market. For total packaging solution, transport packaging as well as brand and label design should also be a consideration.

PH2/2020/000172 discloses the processing method of producing ready-to-eat chocolate rice porridge. The said patent developed a process to create nutritious meal for breakfast or snacktime, thereby giving a healthy alternative or substitute to instant noodles of canned foods. The process includes a) preparation of ingredients: washing and soaking of rice, coconut milk, pure tablea and brown sugar; b) precooking a liquid mixture prepared by combining fresh coconut milk, pure tablea,

brown sugar and water; c) filling of retortable stand-up pouch with water soaked rice; d) adding the pre-cooked mixture in the stand-up pouch in a vertical non-agitating water retort for an hour at 116°C.

The objective of the utility model is to develop a process that will produce new product from adlai that can be commercially available for general population most specially to the niche market, people with prevalence of impaired fasting glucose and with high fasting blood sugar, elevated blood pressure, and working extraneous activities like military and police personnel. The products should have features of ready-to-eat, shelf stable and long product shelf life. With the above mentioned process, the process develop for ready to eat shelf stable adlai porridge is different due to the following: I) Ingredients used are adlai grits (not rice), water, and salt, and modified starch (not indicated in PH2/2020/000172). The newly developed process did not use coconut milk; 2) The new process has pre-cooking of adlai in boiling water which make it different to PH2/2020/000172 as it only soak rice in water; and boiling of liquid (soup stock) has salt, water, and modified starch. No coconut milk added. Modified starch was used to improve product consistency; 3) Separate filling of pre-cooked adlai and soup stock, 4) The retort temperature used in new process is 118°C and not 116°C.

**SUMMARY OF THE UTILITY MODEL**

Disclosed is a process of producing new product using adlai grits. The product, adlai porridge using adlai grits, was applied with retort pouch packaging technology to become ready-to-eat and shelf stable. The process was established using the appropriate ratio of adlai grits and water, parboiling time, use of anti-staling agent, and retort processing parameters to produce the desired quality of the product. Product was packed in two types of high barrier retort pouch and applied with retort pouch packaging technology to achieve shelf life of 1 year or more at ambient storage condition 32±4°C).

The utility model aims to produce new product using adlai, an alternative staple food to rice and corn. With the application of retort pouch packaging technology, new product was developed for adlai with the feature of long product shelf life of 1 year

or more at ambient temperature (32±4°C) using either vapor release Alox-PET/Nylon/ RCPP or PET/Aluminum/Nylon/CPP. The present utility model will offer a new kind of food in the market particularly to its niche market, 30 million men and women Filipinos ages 20 and above with prevalence to impaired fasting glucose and high fasting blood glucose (2018-2019 ENNS, DOST-FNRI; PSA, 2020).

## BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

Fig. 1 is a flowchart of a process of producing ready-to-eat (RTE) adlai porridge.

## DETAILED DESCRIPTION

Effect of retorting on adlai porridge was determined to establish the pre-treatment of the product. Non-retorted and retorted adlai porridge were subjected to sensory evaluation as shown in Table I. There were no significant differences in appearance, aroma, saltiness, and taste between non-retorted and retorted adlai porridge. However, the comparison of non-retorted and retorted adlai porridge in terms of texture (porridge), texture (adlai grits), texture acceptability, and overall acceptability showed significant differences from one another. The texture of retorted adlai porridge was thicker compared to non-retorted porridge. For the adlai grits, the texture was softer when retorted compared to a non-retorted one. Further heating from retort processing caused the adlai grits to swell more and contribute to the porridge thickening. Similar to a study conducted by Wang et. al (2021) on rice porridge, cooking method and cooking time have a significant impact on the texture properties. Increasing heating time results to a declining trend in hardness.

Overall, the sensory panelists rated the non-retorted adlai porridge as more acceptable than the retorted adlai. The perceived differences in those attributes contributed to the difference in overall acceptability. The overall acceptability of non-retorted was rated as 'like very much, while the retorted one was rated as 'like moderately' by the panelists.

Table 1. Sensory evaluation of non-retorted and retorted adlai porridge

| Sensory Attributes | Condition(s) | |
|---|---|---|
| | Non-retorted | Retorted |
| Appearance | 5.57 ± 1.18 a | 5.71 ± 1.28 a |
| Acceptability of Appearance | 8.14 ± 0.99 a | 7.50 ± 1.18 a |
| Aroma | 7.86 ± 1.06 a | 8.29 ± 0.59 a |
| Texture (porridge) | 5.14 ± 1.12 a | 6.57 ± 0.73 b |
| Texture (adlai grits) | 3.93 ± 1.03 a | 2.79 ± 1.47 b |
| Acceptability of Texture | 8.21 ± 0.67 a | 6.79 ± 1.37 b |
| Saltiness | 4.93 ± 1.22 a | 4.71 ± 1.10 a |
| Taste | 7.43 ± 1.29 a | 7.14 ± 1.12 a |
| Overall Acceptability | 8.00 ± 0.96 a | 6.86 ± 1.35 b |

Values are expressed as mean ± standard deviation. Means followed by the same letter within the row are not significantly different at p=0.05 (n=14)

Legend: **Appearance**: 1=extremely dark, 2= moderately dark, 3= slightly dark, 4=just right, 5= slightly light, 6= moderately light, 7=extremely light; **Acceptability of Appearance**: 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Aroma:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Consistency:** 1=extremely thin, 2= moderately thin, 3= slightly thin, 4=just right, 5= slightly thick, 6= moderately thick, 7=extremely thick **Texture:** 1=extremely soft, 2= moderately soft, 3= slightly soft, 4=just right, 5= slightly hard, 6= moderately hard, 7=extremely hard; **Texture Acceptability:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Saltiness:** 1=extremely bland, 2= moderately bland, 3= slightly bland, 4=just right, 5= slightly salty, 6= moderately salty, 7=extremely salty **Taste:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Overall acceptability**:9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely.

Based on the initial results, pre-treatments for RTE aldai porridge was established by conducting experiments on 1) effect of parboiling time, 2) effect of modified starch.

1. Effect of parboiling time

Table 2 and 3 show the results of sensory evaluation and physico-chemical analysis of adlai porridge with different parboiling time of adlai.

Table 2. Sensory evaluation of adlai porridge in different pre-cooking times.

| Sensory Attributes | Pre-cooking time (minutes) | | |
|---|---|---|---|
| | 3 | 6 | 9 |
| Appearance | 4.71 ± 1.23 a | 4.93 ± 1.36 a | 4.43 ± 1.45 a |
| Consistency | 5.21 ± 1.14 a | 4.14 ± 0.97 b | 2.64 ± 0.82 c |
| Acceptability of Consistency | 7.00 ± 1.35 a | 7.29 ± 1.12 a | 6.07 ± 1.66 a |
| Texture (adlai grits) | 3.57 ± 1.02 a | 3.34 ± 1.02 a | 3.00 ± 0.88 a |
| Acceptability of Texture | 7.71 ± 1.07 a | 7.64 ± 0.84 a | 7.00 ± 1.11 a |

Values are expressed as mean ± standard deviation. Means followed by the same letter within row are not significantly different at p=0.05 (*n*=15)

Legend: **Appearance**: 1=extremely dark, 2= moderately dark, 3= slightly dark, 4=just right, 5= slightly light, 6= moderately light, 7=extremely light; **Consistency:** 1=extremely thin, 2=moderately thin, 3=slightly tin, 4=just right, 5=slightly thick, , 6= moderately thick, 7=extremely thick; **Consistency acceptability:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Texture:** 1=extremely soft, 2= moderately soft, 3= slightly soft, 4=just right, 5= slightly hard, 6= moderately hard, 7=extremely hard; **Texture Acceptability:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely

The results of the sensory evaluation of adlai porridge at different pre-cooking times showed no significant difference in all sensory attributes except for consistency. A shorter pre-cooking time of adlai grits resulted in thicker consistency of adlai porridge after retorting due to further absorption of added soup stock (30g: 170 g ratio of pre-cooked adlai to soup stock). The consistency of porridge becomes more acceptable as pre-cooking time becomes shorter. Adlai porridge, pre-cooked for 3 minutes had a more acceptable texture and was rated as 'just right' by the panelists.

For physico-chemical analysis, the results of pH, water activity, and color of pre-cooked adlai for 3 min. and 6 min. are not significantly different from one another, but they are significantly different from those of adlai pre-cooked for 9 min. The differences in physico-chemical properties were not detected in all sensory attributes except consistency.

Table 3. Physico-chemical test of adlai porridge in different pre-cooking times.

| Physico-chemical test | Pre-cooking time (minutes) | | |
|---|---|---|---|
| | 3 | 6 | 9 |
| pH | 7.13 ± 0.04 a | 7.13 ± 0.03 a | 6.99 ± 0.01 b |
| Water activity | 0.994 ± 0.001 a | 0.994 ± 0.001 a | 0.996 ± 0.003 b |
| Color | | | |
| L | 65.4 ± 0.91 a | 65.5 ± 0.93 a | 66.6 ± 0.82 b |
| a | 0.1 ± 0.40 a | -0.1 ± 0.24 a | 0.6 ± 0.38 b |
| b | 5.3 ± 0.90 a | 5.1 ± 0.58 a | 6.8 ± 0.96 b |

Means followed by the same letter within row are not significantly different at p=0.05, for pH and aw, n=6, for color n=8.

2. Effect of modified starch

Tables 4 and 5 show the results of sensory evaluation and physico-chemical analysis of adlai porridge with different concentrations of modified starch added to the soup stock.

The sensory evaluation results of adlai porridge with varying concentrations of modified starch showed no significant difference among each other in all sensory attributes. All 3 concentrations of modified starch are significantly different with the control (without modified starch). The results showed higher acceptability of adlai porridge with modified starch compared to the control (without modified

starch). The concentration with the most acceptable consistency and texture is 2% MS. Similar with the study conducted by Ho-Hur et. al (2002), addition of modified starch enhanced the physical property of oyster porridge.

In terms of physico-chemical analysis, all adlai porridge at different modified starch concentrations were not significantly different in terms of pH and water activity. In terms of color, the 2% concentration of adlai porridge was significantly different from the 1% and 1.5% modified starch.

Table 4. Sensory evaluation of adlai porridge in different concentrations of modified starch.

| Sensory Attributes | Concentration of modified starch (%) | | | |
|---|---|---|---|---|
| | **1.0** | **1.5** | **2.0** | **Control** |
| Appearance | 5.20 ± 1.37 a | 4.87 ± 1.53 a | 4.67 ± 1.37 a | 4.60 ± 1.44 a |
| Consistency | 3.93 ± 1.26 a | 4.47 ± 0.96 a | 4.60 ± 1.04 a | 3.00 ± 0.91 b |
| Acceptability of Consistency | 6.67 ± 1.38 a | 7.27 ± 0.86 a | 7.47 ± 0.60 a | 5.53 ± 1.85 b |
| Texture (adlai grits) | 3.60 ± 0.89 a | 3.73 ± 0.72 a | 3.67 ± 0.98 a | 3.20 ± 1.34 a |
| Acceptability of Texture | 6.93 ± 1.27 a | 7.33 ± 0.67 a | 7.53 ± 0.75 a | 6.33 ± 1.56 a |

Values are expressed as mean ± standard deviation. Means followed by the same letter within row are not significantly different at p=0.05 (*n*=15)

Legend: **Appearance**: 1=extremely dark, 2= moderately dark, 3= slightly dark, 4=just right, 5= slightly light, 6= moderately light, 7=extremely light; **Consistency:** 1=extremely thin, 2= moderately thin, 3= slightly thin, 4=just right, 5= slightly thick, 6= moderately thick, 7=extremely thick; **Consistency Acceptability:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Texture:** 1=extremely hard, 2= moderately hard, 3= slightly hard, 4=just right, 5= slightly soft, 6= moderately soft, 7=extremely soft; **Texture Acceptability:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely

Table 5. Physicochemical tests of adlai porridge in varying concentrations of MS.

| Parameter | Concentration of modified starch (%) | | |
|---|---|---|---|
| | 1.0 | 1.5 | 2.0 |
| pH | 6.62 ± 0.02 a | 6.60 ± 0.02 a | 6.60 ± 0.02 a |
| Water activity | 0.989 ± 0.002 a | 0.993 ± 0.003 a | 0.991 ± 0.001 a |
| Color | | | |
| L | 67.1 ± 0.91 a | 66.3 ± 0.97 a | 64.1 ± 1.12 b |
| a | -0.5 ± 0.14 a | -0.5 ± 0.21 a | -0.4 ± 0.17 a |
| b | 5.3 ± 0.55 a | 5.5 ± 0.65 a | 4.8 ± 0.54 b |

Means followed by the same letter within row are not significantly different at p=0.05, for pH and aw, n=6, for color n=8.

The heating parameters recorded for adlai porridge is shown in Table 6. The highest recorded values of jh (0.40) and fh (16.89) were used in the computation of processing time for adlai porridge.

Table 6. Heating parameters for RTE adlai porridge in retort pouch (200 g).

| No. trial (s) | Heating parameters | |
|---|---|---|
| | jh | fh |
| 1 | 0.33 | 15.70 |
| 2 | 0.38 | 15.17 |
| 3 | 0.33 | 15.17 |
| 4 | 0.40 | 14.57 |
| 5 | 0.38 | 16.89 |

Adlai porridge in two types of packaging produced using the established process schedule was evaluated for sensory evaluation and physicochemical analysis shown in Tables 7 and 8 respectively. Table 7 shows the evaluation of Alox-PET/Nylon/RCPP with vapor release and PET/Aluminum/Nylon/CPP processed with adlai porridge.

Based on the sensory evaluation results, no significant differences between the two products were observed for all attributes except for appearance and consistency. Adlai porridge packed in vapor release (Alox-PET/Nylon/RCPP) has a higher overall acceptability compared to product packed in foil pouch (PET/Aluminum/Nylon/CPP).

Table 7. Sensory evaluation of RTE adlai porridge processed in Alox-PET/Nylon/RCPP with vapour release and PET/Aluminum/Nylon/CPP

| Sensory attributes | Retortable pouches | |
|---|---|---|
| | Alox-PET/Nylon/RCPP | PET/Aluminum/Nylon/CPP |
| Appearance | 5.71 ± 1.03 a | 5.00 ± 1.41 b |
| Acceptability of Appearance | 7.71 ± 0.88 a | 7.79 ± 0.77 a |
| Aroma | 7.57 ± 0.73 a | 7.57 ± 0.73 a |
| Consistency of porridge | 3.64 ± 1.11 a | 4.21 ± 1.08 b |
| Consistency acceptability | 6.93 ± 0.88 a | 6.93 ± 0.80 a |
| Texture (adlai grits) | 4.86 ± 1.12 a | 4.79 ± 1.26 a |
| Texture acceptability | 6.71 ± 1.22 a | 6.79 ± 1.01 a |
| Saltiness | 4.71 ± 0.88 a | 5.07 ± 0.88 a |
| Taste | 6.93 ± 1.03 a | 6.93 ± 0.70 a |
| Overall acceptability | 7.21 ± 1.01 a | 7.07 ± 0.70 a |

Values are expressed as mean ± standard deviation. Means followed by the same letter within row are not significantly different at p=0.05 *(n*=14)

Legend: **Appearance**: 1=extremely dark, 2= moderately dark, 3= slightly dark, 4=just right, 5= slightly light, 6= moderately light, 7=extremely light; **Acceptability of Appearance**: 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Aroma:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Consistency:** 1=extremely thin, 2= moderately thin, 3= slightly thin, 4=just right, 5= slightly thick, 6= moderately thick, 7=extremely thick; **Acceptability of consistency:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Texture:** 1=extremely soft, 2= moderately soft, 3= slightly soft, 4=just right, 5= slightly hard, 6= moderately hard, 7=extremely hard; **Texture Acceptability:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Taste:** 9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely; **Overall acceptability**:9=Like extremely, 8=Like very much,7=like moderately, 6= like slightly, 5= neither like nor dislike, 4=dislike slightly, 3= dislike moderately, 2= dislike very much, 1=dislike extremely

Table 8. Physico-chemical tests of RTE adlai porridge processed in Alox-PET/Nylon/RCPP with vapour release and PET/Aluminum/Nylon/CPP

| Parameter | Retortable pouches | |
|---|---|---|
| | Alox-PET/Nylon/RCPP | PET/Aluminum/Nylon/CPP |
| pH | 7.22 ± 0.03 a | 7.22 ± 0.04 a |
| Water activity | 0.994 ± 0.001 a | 0.994 ± 0.001 a |
| Color | | |
| L | 64.9 ± 1.68 a | 64.9 ± 1.25 a |
| a | 0.7 ± 0.30 a | 0.6 ± 0.26 a |
| b | 7.2 ± 1.07 a | 7.4 ± 0.68 a |

Means followed by the same letter within row are not significantly different at p=0.05, for pH and aw, n=6, for color n=8.

Table 9. Evaluation of retortable pouches using the established processing time for RTE adlai porridge (200 g).

| Parameters/Properties | Retortable pouches | |
|---|---|---|
| | Alox-PET/Nylon/ RCPP | PET/Aluminum/Nylon/CPP |
| Seal strength, N/15mm<br>Manufacturer's seal<br>Toll packer's seal | <br>67.309<br>31.882 | <br>63.065<br>39.099 |
| Oxygen Transmission Rate, cc/$m^2$-day | 52.286 | 0.017 |
| Ability to withstand 118°C | Can withstand retort processing time & temperature | Can withstand retort processing time & temperature |
| Visual inspection for change in appearance and flex crack | No delamination & no change in color of pouches | No delamination & no change in color of pouches |

The RTE adlai porridge is a new product using adlai, the commodity being promoted by the Department of Agriculture as an alternative staple food to rice and corn. Adlai is a good alternative ingredient as research in modern medicine has confirmed its beneficial effects on health, including the ability to regulate blood sugar, blood lipids. blood pressure to improve gastrointestinal physiology and reproductive endocrine hormones (Hsia et al., 2007). Establishment of the process to create new product from adlai will help the Food Industry to cater the need of niche market, 30 million men and women Filipinos ages 20 and above with prevalence to impaired fasting glucose and high fasting blood glucose (2018-2019 ENNS, DOST-FNRI; PSA, 2020). Military and police with population of 151,000 (Global firework, 2023) and 207,642 respectively (PSA, 2021) are also potential markets.

Coupling the properties of adlai as good staple food with an appropriate packaging technology will be an effective approach to capture the niche market. Development of new adlai products using retort pouch packaging technology is one of the technologies to produce RTE meals which is expected to reach USD 2,023.2 million by 2028 (6Wresearch 2023). This technology uses retort pouch that can withstand thermal processing, and retort chamber with counter pressure. Requirements for the technology are available in the country and feasible for companies to expand

production to serve the niche market. The technology does not just promise product protection but as well as bringing adlai to be positioned in a competitive market.

To recap, the process for producing ready-to-eat (RTE) adlai porridge using adlai grits or any form of adlai as raw material comprises the following steps, to wit:

a. Pre-cooking of adlai in boiling water with an adlai and water ratio of 1:6 to 1:10 by weight for 3 to 9 minutes;
b. Preparing soup stock with 0.4 to 0.6% iodized salt and 1 to 2% modified starch by weight of water;
c. Mixing the pre-cooked adlai and soup stock in a ratio of 6:34 to 8:32 by weight;
d. Filling the 200 grams of the mixture in a retort pouch;
e. Sealing the retort pouch; and
f. Retorting the adlai porridge – containing retort pouch at 118°C to achieve condition with sterility value of 5.5 minutes.