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Analysis and Control of Bulgaria Onion Cold Soup

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Abstract

A survey of microbial pollution and health quality change was conducted during the process of the production and refrigeration of Onion Cold Soup to provide a basic reference for the catering industry for the implementation of HACCP management system for food and to ensure the safety of food. A basic formula of Onion Cold Soup was made according to the literature, then the total number of bacteria, pseudomonas, lactic acid bacteria, enterobacter, cocci and microzyme were tested in the main raw material and finished product detection according to the national standard method; hot boiling water to wash the main raw materials, statistical reduction in strain rate, in order to determine improvement formula. The finished cold soup at 4℃ refrigerator made flora analysis, and drew up the date of minimum durability. The total bacterial count of the Onion Cold Soup by the basic formula is 2.4×10^4cfu/g, among which coriander occupied 53%, egg 24%, onion and lemonade 17% and 6%; respectively; and after blanching, the total number of colonies in the improved formulation is 1.1×10^3, the sterilization rate reaches 95.4%, and the effect is slightly obvious. The Onion Cold Soup made in kitchen can be seriously polluted by microbial, hot boiling water to wash the main raw materials and avoid secondary pollution, thus the bacterial count can be controlled effectively, then the shelf life was extended and the risk of food poisoning was reduced, which did a lot of benefit to the catering industry the food safety management.

Keywords: Onion Cold Soup; Total Number of Colonies; Date of Minimum Durability; Bacterial Identification; Food Safety

1 INTRODUCTION

Cold soup originated from southern Spain on the Mediterranean climate and Lucia inland, where in hot and dry summer, workers who work during the day have made cold soup to resist hot weather , is the essential food in summer[1]. In general, Cold soup consists of summer fruits and vegetables, rich in fiber and vitamin. Mostly Cold Soup containing a variety of fresh fruits and vegetables is made from a small amount of meat and spices. Though cold soup serving temperature is between 1℃ and 10℃, some people still used to drink with ices. Generally speaking, cold soup with cool and refreshing, appetizing good characteristics, is suitable for summer drinking [2].

In the process of machining, fresh cut bound to Cold soup, but due to the production of raw materials of most high moisture and rich nutrition, is very beneficial to the growth of microorganisms under appropriate conditions [3]. And also because cold soup is almost impossible to implement thermal sterilization in the process of processing and edible, although this makes raw food as far as possible to keep the raw materials of nutrients and nutrient, safety and health can't be guaranteed, so the risk of food poisoning is greater.

It is particularly urgent to know how to set up a set of preventive monitoring system in the processing and production of cold soups, aiming at raising the level of food security of this kind of food. Though integration of the existing research materials, the investigation and analysis is most on the manufactured goods quantity, rarely on reason as well as on evaluation of the effectiveness of the corresponding control measures, which is not good for the implementation of HACCP management in this kind of food [4]. In this paper, the experimental discussion is concerned with refrigerated and microbial contamination in the process of food production, health quality change and its control technology.

2 MATERIALS AND METHODS

2.1 Materials

Onion, egg, coriander, lemonade, salt, monosodium glutamate and pepper, all of them are bottled or bagged products and are bought from Auchan supermarket in Yangzhou.

2.2 Reagents and Culture Medium

1) Culture Medium

Nutrient AGAR culture medium; PSA medium; MRS culture medium; VRBGA culture medium; MSA medium[5]; Peptone water (BP) medium; Sugar or alcohol fermentation culture medium; Glucose, peptone medium; the Montessori citric acid salt medium; ferrous sulfate semisolid culture medium; three iron sugar AGAR culture medium; Nitrate medium; Dynamic medium; Amino acid decarboxylase test medium, starch hydrolysis medium, fructan form medium, gelatin medium, determination of l-arginine double enzyme hydrolysis medium[6].

2) Reagents

Gram Stai, Kovacs, 5%-Naphthol anhydrous ethanol solution, 40% KOH solution, diphenylamine reagent, catalase reagent, oxidase reagent, methyl red indicator, 1.6% bromocresol purple ethanol solution, bromothymol blue 1% ethanol solution, according to the literature [6].

2.3 Equipment

XS-18 biological microscope, DT-200 Electronic Balance, pHS-3C pH meter, DFG30/HG101 electric blast drying oven, HG303 type electric drying incubator, Automatic electric pressure LDZX-40B2 vertical steam sterilizer, Adjustable million electric furnace, BCD-195WIV refrigerator, HH-8 number substantially constant temperature water bath Electric Appliance, SW-CJ-1F type clean bench, pH 5.5-9.0 Precision dipstick

2.4 Method

1) Protocol of a Basic Formula of Onion Cold Soup

The basic formula of Onion Cold Soup is studied according to the literature shown in Table 1.

TABLE 1 BASIC FORMULA OF ONION COLD SOUP

materials	onion	coriander	egg	Lemonad	salt	monosodium glutamate	pepper
Usage amount(g)	150	50	30	75	3	1	0.8

2) Preparation of Onion Cold Soup Samples

Onion was washed and cut into thin slices; boiled eggs,; coriander washed, peeled and sliced and then cut into fine, followed by the adding of salt, monosodium glutamate, pepper and the cold water, then, mixed with onion, egg and coriander with the addition of lemonade.

3) Onion Cold Soup Contamination Investigation and the Source Analysis

The raw materials and the finished goods of respectively 25 g were sampled with sterile procedure. 1:10 incremental dilution, and 1 mL pour plate were made; then as well as two plates for each dilution, pour nutrient agar approximately at 45℃ with the content of 15 mL, and the dish was rotated to mix the solution; the medium was solidified and then the medium was inverted in the incubator at 37℃ for 24 h, followed by counting the result[8]. The number of bacteria in the main raw material was taken as the variable, the usage as weight, and the source of finished bacteria number was measured by the weighted average method.[9]

4) Control of the Number of Bacteria in Onion Cold Soup

The onion and coriander was treated with blanching treatment for 5 min by boiling water, then the bacteria were counted. Compared with the measured value of the original foundation formula, the bacteria reduction rate was computed.

5) The Change in Health Quality of the Onion Cold Soup during Refrigeration

Cold soup with 25 g sample as a unit basis and improved formulation, was placed in a sterile petri dish, cooled and preserved at 4℃ in refrigerator, and out of the refrigerator per 24 h, by time sequence to measure the number of bacteria and the growth curve was graphed. Meanwhile, sensory test of the product was made, to evaluate the quality of their health, by which the salad shelf life was established.[10]

6) Microflora Analysis

Representative strains of common nutrient AGAR plate were cultivated, separated, purified and cant preserved, in addition, gram staining microscopy, sugar alcohol fermentation experiment, V- P experiment, methyl red experiment, such as bacteria identification was used and analyzed.[11] Please refer to *Bergey's Manual of Determinative Bacteriology* .

3 RESULTS AND ANALYSIS

3.1 Contamination Investigation and the Source Analysis of Onion Cold Soup

The analysis results of bacteria number in raw materials and finished product are shown in Table 2.

TABLE 2 DATE FOR THE NUMBER OF BACTERIA IN RAW MATERIALS AND FINISHED PRODUCT

Items	Weight (g)	Operate time(min)	The total number of bacterial colonies(cfu/g)
onion	300	10	1.6×10^3
coriander	100	3	5.8×10^5
egg	60	3	4.3×10^3
lemonade	150	9	7.0×10^2
finished product	610	25	2.4×10^4

Results showed that the highest number of bacteria in coriander is due to its growth mode, because coriander grows the soil, and is irrigated by manure and sewage, which makes it difficult to clean. This experiment observed the flora composition in gram positive bacteria, and it also confirmed this view. The heating process of eggs has a bactericidal effect, however, during the process of shelling and cutting, the eggs were in touch with hands, knife, chopping block, and were exposed to air. Consequently, it is also provided with a small amount of bacteria. However, onion contains phytoncide, such as allicin-crystalline substance extracted from onion spicy sauce, when the concentration in1/100000, can kill Staphylococcus aureus, bacillus, therefore having a very strong sterilization ability. Strong acidic lemon juice in a certain extent inhibits the growth of bacteria

The bacteria number which has different kinds of raw material is variable, while usage amount is weight, thus it is concluded that the bacteria number of finished product by basic formula is 1.1×10^3cfu/g. By analyzing the number of bacteria source, it shows that 53% of bacterial count comes from coriander, 24% from egg, 17% and 6% respectively from onion and lemonade. The measured values of bacteria number of the cold soup produced by basic formula could be 2.4×10^4 cfu /g, which shows that the level of the number of bacteria in the product is also related to the operation of the kitchen. Due to the abundance of the raw materials, on one hand, the operation time was extended under room temperature and so that the bacteria were multiplied, on the other hand, contaminated media were contacted such as knives, chopping board frequently, then exposed to air for a long time, stirring seasoning also inevitably made aerosols, and the bacteria contact food repeatedly. So all of these made the salad finished product a dramatic rise in the actual number of bacteria.

3.2 Control the Number of Bacteria and Build a New Formula of Onion Cold Soup

1) Control the Number of Bacteria of Onion Cold Soup

The change of bacteria in raw materials after 5 min blanching treatment by boiling water is shown in Table 3.

From Table 3, the rate of bacteria after boiling water reduction 95.4%, especially the rate of bacteria of coriander is very obvious, as high as 94.7%; and the second is the ratio of bacteria to 58.1.8 % of onion. It is shown that scald treatment is a very effective means of reducing bacteria, and bacterial count of salad may be control effective.

TABLE 3 THE CHANGES OF BACTERIAL COUNT AFTER BLANCHING

Items	The total number of bacterial colonies of raw materials (cfu/g)	The total number of bacterial colonies after boiling water (cfu/g)	The ratio of bacteria reduction (%)
onion	1.6×10^3	6.7×10^2	58.1
coriander	5.8×10^5	3.1×10^4	94.7
finished product	2.4×10^4	1.1×10^3	95.4

3.3 The Change of the Microbial Flora in the Process of the onion Soup Cold Storage

1) The Changes for the Number of Bacteria during the Blanching Treatment of Onion Cold Soup

Figure 1 shows that at 4 ℃, basic formula of the bacterial count rise by wavy lines, reaching the peak value at the 6d. Improved in the initial stage of cold storage process, the quantity of bacteria is by about one order of magnitude lower than the basic formula, then rising, and the rapid proliferation that cold shock treatment has a bactericidal effect on bacteria.

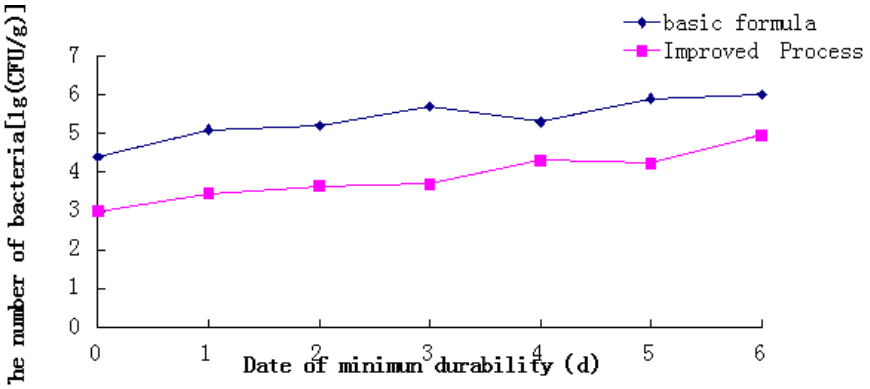

FIG. 1 THE CHANGES FOR THE NUMBER OF BACTERIA AFTER THE BLANCHING PROCESS OF ONION COLD SOUP

2) The Changes for the Number of Pseudomonas during the Blanching of Onion Cold Soup

Figure 2 shows that in the storage process of 6d, basic formula of pseudomonas number as a whole presents slowly rising trend in wavy lines. Improved process of pseudomonas number at an early is lower than the original formula, and similar to the wavy lines of rising, growing very slowly during the preservation period, showing that the blanching process has certain inhibitory effect on Pseudomonas.

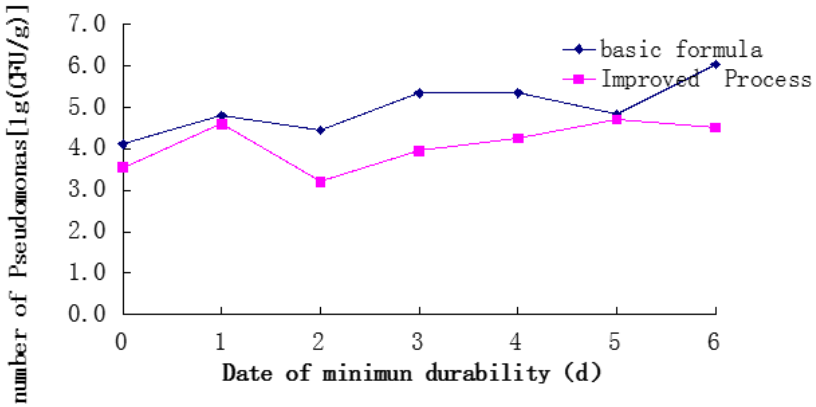

FIG. 2 THE CHANGES FOR THE NUMBER OF PSEUDOMONAS AFTER THE BLANCHING PROCESS OF ONION COLD SOUP

3) The Changes for the Number of Lactic Acid Bacteria during the Blanching of Onion Cold Soup

Figure 3 shows that in the storage process of 6d, basic formula`s number of lactic acid bacteria falls within 0 to 6 d, but improved formula in 1-3 d slowly rises, 3 to 4 d days down, 4 to 6 d flat. Improved process of lactic acid bacteria number in 0 day is nearly an order of magnitude lower than the basic formula; indicating that the improvement measures on the role of the sanitary quality of the final product.

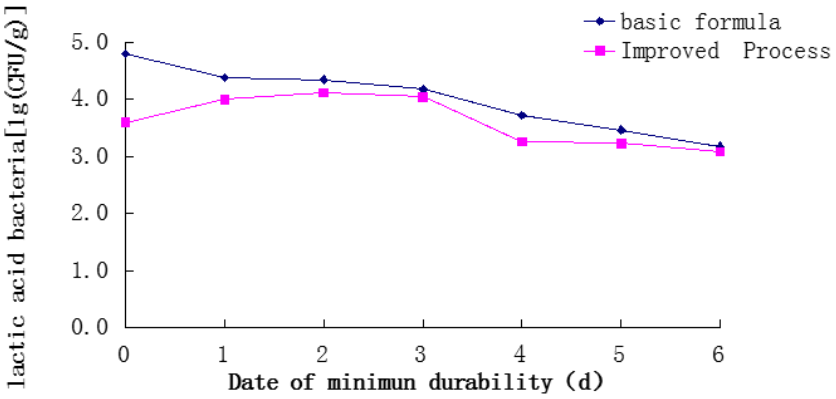

FIG. 3 THE CHANGES FOR THE NUMBER OF LACTIC ACID BACTERIA AFTER THE BLANCHING PROCESS OF ONION COLD SOUP

4) The Changes for the Number of Enterobacter during the Blanching of Onion Cold Soup

Figure 4 shows that during the whole storage, basic formula of enterobacter number in 0 and 1 d is on the rise, in 1-5 d basic flat, in 6 d began to decline. Improved process of enterobacter number in low temperature environment is flat, coming back after 4 d, while early suppression is more noticeable at low temperature, and in the initial stages of cold storage, enterobacter number is significantly less than the basic formula of enterobacteriaceae, showing that heat for enterobacter has certain inhibition of proliferation. 4 to 6 d basic coincidence could be two lines of the chemical changes of food or other bacteria growth form of metabolites on the growth of the bacteria increasing its nutrition environment which exerts a positive effect [13].

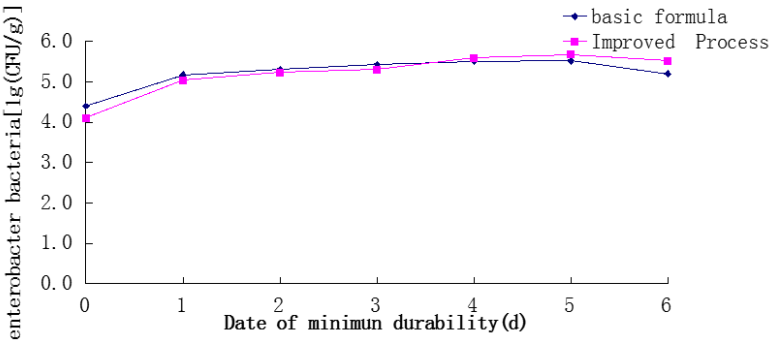

FIG. 4 THE CHANGES FOR THE NUMBER OF ENTEROBACTER AFTER THE BLANCHING PROCESS OF ONION COLD

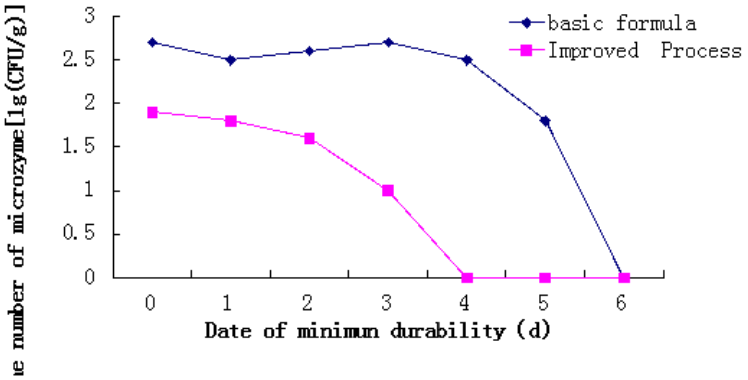

FIG. 5 THE CHANGES FOR THE NUMBER OF MICROZYME AFTER THE BLANCHING PROCESS OF ONION COLD SOUP

5) The Changes for the Number of Microzyme during the Blanching of Onion Cold Soup

Figure 5 shows that in the process of 6 d refrigeration, basic formula of the number of yeast in 1-3 d down soon, in 4 d flatten out, while in 6 d goes to zero. Improved process on the number of yeast in 1-2 d flats down, two to four

days gradually decreases to zero, thus in the whole storage period the overall number of yeast can be seen compared to other species quantity which is less, hence the low temperature environment is not conducive to the growth of yeast.

3.4 Sensory Quality Changes during Cold Storage of Onion Cold Soup

By sensory inspection, the original basic process products have moderate taste change, and product's freshness declines, no longer suitable for preservation after preservation 4 d under 4℃, which shows its quality guarantee period is 3 d. And improved formula products in storage 5 d didn't appear flavor change, so it is for a period of four days. Based formula is to extend shelf life compared to the original 40%; showing that by blanching, the growth of bacteria pseudomonas is inhibited, enterobacter, maintenance of onion soup refrigeration products' health quality, shelf life that has been extended has played a key role

3.5 Identification

1) The Identify and Analyse of Representative Strains

The colony characteristics were observed, and the typical colony was picked by streak plate method, then purified in subculture after 2-3 times.

2) Phenotypic Characterization and Identification of Typical Bacteria

According to table 4 -7, the identifiied results by "common bacteria system appraisal handbook" are that E-O is Citrobacter freundii, E-T is Klebsiella; E-P is Serratia which can produces pink or magenta pigment- spirit; therefore, it can be different from other species; P-O is Pseudomonas. stutzeri; P-T is Pseudomonas. Syringae, L-O is Listeria; L-T is Brochothrix.

TABLE 4 PHENOTYPIC CHARACTERIZATION AND IDENTIFICATION OF TYPICAL BACTERIA

Dentified bacteria	Colony characteristics	Results of microscopy
E-0	Colony diameter 2-4 mm on VRBGA medium, smooth, low convex, moist, transparent, grey, surface luster, neat	Bacillus,single or in pairs, flagella around, no capsule
P-O	Colony forming units in PSA medium translucent, margin entire, smooth and moist.	Gram-negative, no spores, smaller
P-T	Colony in PSA medium yellow, oblong, smooth, moist edges, and tidy	Gram-negative bacillus,spores
L-0	Colony diameter 0.5-1.5mm on MRS medium,low convex edge integrity	Regular form a bacterium, gram positive, no spores and capsule.
L-T	Colony diameter 0.75-1.0mm on MRS medium,convex, edge integrity, no Pigment	Regular form a bacterium, gram positive, no spores and capsule.

TABLE 5 EVALUATION TEST OF ENTEROBACTER

Test		E-O	E-T	E-P
Glucose fermentation		+(gas)	+(gas)	+
Lactose fermentation		+	+	+
Mannitol Fermentation		+	+	+
Sugar fermentation		+	+	+
Maltose fermentation		+	+	+
Dynamic test		+	+	+
Hydrogen sulfide test		-	+	+
Indole test		-	+	+
Voges-Prokauer test		-	+	+
Carbohydrate utilization test		+	+	...
Determination of catalase		+	+	...
Determination of oxidase		-	-	...
Citrate test		+	+	+
Trisaccharide iron test	**Agar slope**	+	+	+
	Basal layer	+	+	+
	Gas	+	+	+
	Hydrogen sulfide	-	-	-

Note: "+" is positive and negative is "-". "..." is not detection.

TABLE 6 EVALUATION TEST OF PSEUDOMONAS

Test	P-O	P-T
Hydrogen sulfide test	+	+
Determination of catalase	+	-
Glucose fermentation	+(gas)	+(gas)
Carbohydrate utilization test	+	+
Determination of amino acid decarboxylase	-	-
Fructan form test	-	-
Nitrate reduction test	-	-
Amylohydrolysis	+	-
Gelatin liquefaction	-	-

Note: "+" is positive and negative is"-".

TABLE 7 EVALUATION TEST OF LACTIC ACID BACTERIA

Test	L-O	L-T
Gram stai	G+	G+
Catalase test	+	-
Dynamic test	+	-

Note: "+" is positive and negative is"-".

4 CONCLUSIONS

Biological contaminations of food include bacteria, fungi and viral pollution, parasite contamination, insect contamination. In nature, there are many kinds of microbes can be beneficial to human, as well a lot of harmful microorganisms. In the field of food hygiene and safety disciplines, more attention should be paid to negative effect of microorganism and its control. Microorganisms harm includes the effect of pathogenic microorganisms and the role of microorganisms. [14]

Due to the cold soup's raw material carrier, some raw materials without heating sterilization in the processing, are bound to make all kinds of bacteria remained, the chance of occurrence of food poisoning. In recent years, due to r, cold type of dish of food poisoning is on the rise in some regions such as Shenzhen futian district, the health threat is significant. [15] For example, L- 0 is Listeria distributed in nature, isolated from sewage, rotten vegetable matter, also in animal and human feces, found in vegetables and silage. Parasitic on the milden warm-blooded animals, including human body, causes meningitis, septicemia, endocarditis and abscess. Many symptoms have been proved to be fatal. [6]

Analysis of bacterial detriment sources found that cold soup materials take bacterium and mixed bacteria, and the production of cold soup is closely related to kinds of vegetables and fruits, the vegetables in planting and growth process, some contact with the soil, manure, some use of sewage irrigation, and causing pollution of the pathogen. The existing standards of pollution-free agricultural products can't be no pathogenic bacteria to vegetables or fruits on the level of detection. However, for the food and beverage industry, raw material can be guaranteed under the premise of sterile, thus the running of cold soup food must also conform to non-toxic harmless, ready-to-eat foods, and pathogenic bacteria shall not exist. This brings to confusion in the catering industry [14].

The experimental results showed that the bacterial contamination of cold soup is quite apart from the kitchen operation, some pollutants originally attached to the vegetables, fruit surface, but in the washing, peeling, cutting, flavor in operation process diffusion, in the process of placing get growth increment, which has a high risk [16]. It is necessary to control bacteria on cold soup materials. Bacterial hazard control does not exclude from the regular health work, such as worker health, hand washing, container dedicated, food and raw materials of low temperature preservation and shelf life, especially the personnel to develop consciousness of sterile operation, cut with direct contact with food, flavor to avoid hand, improvement on the level of cooking mechanized operation, etc., which will be accused of bacteria effect. [17]

There have considerable laws and regulations system concerning food hygiene and food hygiene standards, food quality and safety market access system now. Cold soups food is also a kind of raw vegetables, homemade and easy, so formulating bacterial count microbiological indexes is necessary in order to establish the Onion Soup Cold

freshness determination standards, perfect the safe processing including storage conditions and shelf life of cold soup specification, build cold soups food safety standards, which will have a positive impact on the reasonable management of the catering industry, improvement of the level of supervision and law enforcement, the broad masses of consumers' health rights and interests of the maintenance and construction of a harmonious society. [18]

REFERENCES

[1] Yin Shen, Creative Monk. Shopping guide, 2012 (1788).

[2] Zihua Zhang, Jun Ding. A raw food diet [M]. Shanghai Far East publishing house, 1994. Shen Yin, Creative Monk, boutique shopping guide, 2012 (1788).

[3] Sapers G M. Garzarella L. Pilizota V. Application of browning inhibitor to cut apple and potato by vacuum and pressure infiltration J Food Sci. 1990,56:1049-1053.

[4] Libing Wang, Changfang Dai, Shaohong Gu, etc. HACCP on the control of sauce salad microbial [J], South China Journal of Preventive Medicine, 2004, 30(3):47-50.

[5] Yunsheng Jiang. Cooking Microorganisms [M], China Light Industry Press, 2007, 328-329.

[6] Hui Liu. Modern food microbiology experiment technology [M]. China light industry press, 2009.8.

[7] Zihua Zhang, Jun Ding. A raw food diet [M]. Shanghai Far East Publishing House, 1994. Shen Yin, Creative Monk, boutique shopping guide, 2012 (1788).

[8] GB 4789.2-2010. Microbiological examination of the national standard of the People's Republic of China Food Safety. Determination of the total number of colonies.

[9] Yunsheng, Jiang, Jian Chen. Fan on health research [J], 1997(3):26-30.

[10] Zhangxin Huang. Part of the vegetable cold storage conditions and storage periods [J]. The north garden, 1991 (9): 32

[11] The ministry of health of the People's Republic of China. The food hygiene inspection methods microbiology, China standard press, 2003, (7): 28-84

[12] Ligen Zou Yun Zhao , Le Zhang , et al. Lactic acid bacteria fermentation process of pickled vegetables nitrite change research [J]. Journal of agricultural science and technology, Hangzhou, etc. 2006 (4): 10-12.

[13] Hanhu Jiang, Mingcheng Dong. Food microbiology [M]. 3. Beijing: China agriculture press, 2011.,66-68

[14] Zhijun Wang, Yunsheng Jiang. Food safety [M], China light industry press, 2010, 8-9.

[15] Xun Shang .Shenzhen luohu district food poisoning case analysis and intervention measures. China public health. 1999, (10).

[16] XinJiang Guan. Fresh cut fruit and vegetable of microbial control [J]. Journal of chemical industry in Xinxiang, 2004 (3): 51-53.

[17] Yunsheng Jiang. [M].Cooking health and security of China light industry press, 2008, 252.

[18] Mandan Song Dongmei He, Bing Yang, etc. Salad food microorganism pollution condition investigation and analysis of Guangdong province [J]. South China preventive medicine, 2006, 32 (4) : 65 ~ 67

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