THE STUDY OF SENSORIAL EVALUATION SCREENING FOR NOVEL THAI CURRY PASTE

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ABSTRACT

Curry was a favorite dish in Thai restaurants throughout the world and for good reason. Based on a delicious paste of fresh and dried herbs and spices, curry was unique and unlike any dish in Western cuisine. The endless combinations and fresh taste make curry a popular dish. The curries were the richest dish of Thai red chillies the Thai cuisine, being based on spicy herb and spice pastes, i.e. curry pastes. The base of Thai red curry paste was dry, red chillies, which were very spicy and extremely fragrant.

This purpose would be substituting the red bell pepper for reduced the spicy flavor, but still authentic Thai curries. To study of sensory evaluation was an object to evaluate screenings and training the sensory tester for testing taste, the quality of foods considering a consumer's perception was performed. Then the qualified sensory tester continues to evaluate the sensory taste of food products as novel formula of Thai's curry paste on further. The experiment used 30 candidates mixed male and female tester in age between 20 and 25 years old. The testing material was separated into three parts as, saltines, sweetness, and mixed saltiness and sweetness. In each testing series were adjusted, proper level concentration of salt and sugar.

The results von twelve expert volunteer had 95 % testing accurately that were the tester experiment to distinguish testing the red curry paste. The result of sensory evaluation from the qualified tester was not statistic significantly different (0.05, α) represented in color, smelling, and taste. Twelve trained, qualified testers were then graded sensorial evaluation screening for novel product of Thai curry paste on further. However, most of the attributes were statistically perceived with the same intensity in terms of appearance, aroma or flavor of consumer perspective and preference.

Keyword : study, sensory, evaluation, screening, curry paste

1. INTRODUCTION

Curry is one of Thailand's favorite dishes, however, to only one of many combinations of spices. It contains chili and other herb among other things and can be recognized by its yellow, orange and red color. The Thai housewife blends in a mortar and pestle many other combinations of spices, each with its own name. For our purposes we can call them all curry. In its many forms, curry is common to India and all of Southeast Asia, including Malaya, Indonesia, Laos, Cambodia, and Myanmar. Originating authentic Thai curry pastes require serious effort the paste is made by grinding the ingredients in a mortar and pestle and it takes over 15 minutes until the gradient was homogeneous texture.

The reputation widely known of Thai's curry paste had been from the 16th and 17th centuries onward, when the powerful European trading nations began establishing their trading routes between Europe and South East Asia the Thais were ideally placed to benefit from the introduction of some more ingredients which would contribute farther to the development and history of Thai food. One such introduction is one which we would be forgiven for thinking as a very Thai commodity, "The Chili" was actually introduced by Portuguese Missionaries who brought them over from South America in the 1600s [1], that previously about the history of the chili in Thailand. By way of the reminder, chilies initially came to Thailand during the late 1600s by Portuguese missionaries who had taken a liking to the fiery ingredient in South America [2]. Refer to the tropical rain forest, and optimum climate condition of Thailand was support growing for this plant and spread of a variety species along Kingdom of Thailand which one of the important ingredients in many typical Thai's food.

The main ingredients of red Thai's curry paste are composed with red chili, lemongrass, garlic, kaffir lime (peel of young green fruit), galangal rhizome, salt, shrimp paste (Kapi), and others depended on recipes and local of Thailand. Overpowering pure spices were toned down and enhanced by fresh herbs ingredients such as lemon grass and galangal. Eventually, fewer and fewer spices were used in Thai curries, while the use of fresh herbs increased. It is generally acknowledged that Thai curries burn intensely, but briefly, whereas other curries, with strong spices, burn for longer periods from chili. A typical Thai meal includes four main seasonings: salty, sweet, sour, and spicy, most Thai dishes are not considered satisfying unless they combine all four tastes [2]. The obvious difference, however, is the paste where red curry uses dried red chilies over the green curry which

uses (hotter) fresh green chili peppers. Red curry is generally the less fiery of the two but this really depends on who makes the chili paste.

The strong spices and hotter taste from curry paste had been defined the effect from the capsaicinoids composition of chili, that are unsaturated long-chain vanillylamides [3] of fatty acids present in some varieties of pepper fruit (Fig. 1). According to their biochemical structure, they activate in body vanilloid receptors on taste bud, which have a primary role in the thermoregulation and also in the excessive heat sensation [4]. The period of hot sensation can be followed by a prolonged period of receptors inhibition, which is utilized in pain-relieving procedures in medicine [5]. The strongest effect is caused by the two main members of this class, prevailing capsaicin and less abundant dihydrocapsaicin (Fig. 1); lower content and effect of the other capsaicinoids make them less important. Pepper hotness was originally quantified by sensoria Scoville test [6]

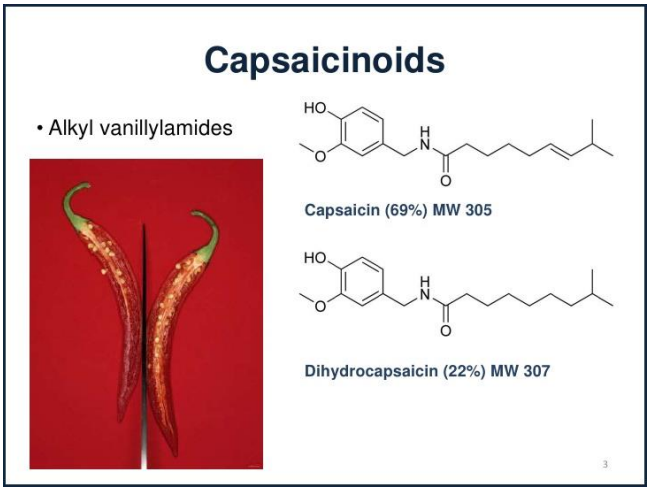


Figure 1. The structure of capsaicinoids came from Thai red chilies had an alkyl vanillylnmides derivative [3].

The Scoville Scale and Scoville Heat Unit (SHU) were named for scientist Wilbur Scoville in 1912. SHU was a measurement unit ranking for a chili pepper's pungency and heat. Originally, Scoville base on ground up peppers and mixed them with sugar water, then tested them with a panel of tasters who sipped from these sugar-water-pepper solutions. Then dilute the solutions bit by bit until they no longer burned the tongues of the tasters, after testing they assign a number to the pepper based on the number of dilutions needed to kill the heat The measurements are using the standard chemical, capsaicin that the main component can be activated taste bud on the tongue. The unit was divided into multiples of 100. Note that one part per 1,000,000 dilutions of water is rated at 1.5 Scoville Units. Pure capsaicin, the stuff that makes chili peppers hot, is rated between 15 – 16,000,000 Scoville units [7]. Thai chili peppers had analyzed about 50,000 – 100,000 SHU per one fruit [3]. Despite the common belief, there were multiples using in the gradient of red curry paste. Thai chili pepper is one the most candidates for the title are small in size and high in heat or pungency. There were not proper at tourist customer and children for eating. While the names of chili peppers are often hotly debated and therefore in a volatile state of flux the world over, some would know that there is particular confusion when the subject comes around to Thailand.

Sweet bell peppers had a zero SHU, which was the typical and appropriate for color (green, yellow, and red), about the size of a large than Thai chili pepper. While the flavor of bell peppers is not hot or spicy, like most other peppers. Color and flavor are determined by the variety of the pepper plant and the stage of ripeness when picked. For example, a red bell pepper is simply a mature green bell pepper. All of which were the advantage to develop ingredients red bell pepper replacement in Thai chili pepper for red curry paste.

In this work, we focused on the development of novel Thai curry paste using red bell pepper in the gradient and adding a several of herbs for making red curry paste that sill conserved authentic Thai curry paste except heat or pungency. Then the sensory evaluation will be determining using statistical analysis to the use of human senses for the purposes of evaluating consumer products.

2. MATERIALS AND METHODS

2.1 Raw material for red Thai curry paste

The ingredient were using 1500 g of dried red bell pepper, 350 g of shallots (*Allium ascalonicum*), 1,505 g of cloves garlic (*Allium sativum* Linn.), 375 g of galangal rhizome (*Alpinia galanga* L. Willd.), 150 g of kaffir lime peel (*Citrus hystrix*), 325 g of coriander root (*Coriandrum sativum*), 225 g of dry pepper seed (*Piper*

nigrum L.), 225 g of dry coriander seed, 225 g of cumin seeds (*Ocimum gratis*simum L.), and 225 g of shrimp paste (Fig. 2). Red bell pepper was chopped eight pieces in diameter and to be dried with hot air oven at 60 ºC for 48 hr. Shallots were minced and sliced into the small piece. Peeling the cloves garlic envelope minced and sliced fresh galangal rhizome and course chopped. Both of the lemongrass stalk, slice off the green peel and slice off as little of the white pith as possible of kaffir lime fruit, and root of coriander were minced and sliced into the small piece. Coriander seed and Cumin seeds were roasted with soft fire and crushed into powder. The shrimp paste or Kapi were enveloped with banana leave then gill with soft fire until dried and represent the unique smell.

2.2 Red curry paste preparation

Soften the dried red bell pepper in a bowl with hot water for 3 minutes then minced into the small piece. Trim the root end and tough outer leaves off the lemongrass stalk. Use only the white part and a little of the green and cut in half. Finely ground the pepper seed, coriander seed, and cumin seeds with powder grinder. In a food processor add the drained bell pepper, garlic, lemongrass, shallots, galangal, kaffir lime, coriander root, shrimp paste, and water for 750 ml. Then added powder of pepper seed, coriander seed, and cumin seeds to blend together until a smooth and thick paste like consistency. Finally the mixture of red curry paste was obtained about 6.0 kg. Store in an airtight container in the refrigerator or freeze in cubes and store in a seal plastic for determination on further.

2.3 Freeze dry process

The fresh red curry paste were frozen at -20 °C and then dried under vacuum (condenser temperature of -110 °C, chamber pressure of 0.1 mbar) using a freeze dyer (Labconco® FreeZone®, Freeze-Dryer Lyophilizer). These freeze-dried samples were then used in a series of rehydration experiments until the probe of moisture content stable signal.

Figure 2. The main herbs and ingredients of red bell pepper curry paste

2.3 Sensory evaluation

The sensory tester were screen from the volunteer tester, undergraduate student from faculty of Science and Technology, Suan Sunandha Rajabhat University (SciSSRU). Screening of sweetness testing were using solution of table sugar (sucrose) in various concentration as 1% w/v, 1.5 % w/v, and 3.0 % w/v. Testing for saltiness contrast were using table salt (NaCl) solution in various concentration as 1.0 % w/v, 1.5% w/v, 3.0 % w/v. The combination of sweetness and saltines were using both of sucrose and NaCl 1.0% w/v, 1.5 % w/v, and 3% w/v respectively. Testing for color and smelling distinguish were using Hale's Blue Boy, a commercial syrup with 3% v/v, 4% v/v, and 5 % v/v respectively. Hale's Blue Boy sweet syrup is a red concentrate sugar syrup compose with 13% w/v sugar, 0.1% w/v Salacca (Sala) odour, and commercial food grade red color. After testing and training the gourmet, the volunteer who passes the testing condition were performing sensory evaluate the color, odour, and taste of red curry paste product.

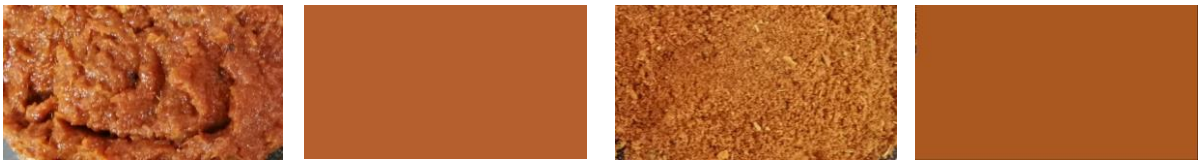
2.4 Statistical analysis

The data were derived from average measurements of 14 testers per treatment. The statistical analysis of data was carried out using SPSS software for the analysis of mean with a matched-pairs t-test is used to test whether there is a significant mean difference between two sets of paired data. The determining significant differences between testing samples at a confidence level at 95% ($P<0.05$). Variable means were compared using Duncan's multiple range tests. The bivariate correlations between color, odors, and texture content assays were analyzed.

3. RESULTS AND DISCUSSIONS

3.1 Red curry paste from red bell pepper

According to the formula described in 2.2 were obtaining 6.0 kg of curry paste (Fig. 3A). The comparison of moisture content between fresh curry paste was and freeze dried curry paste was 70.82 ± 3.36 % (w/w) and 3.56 ± 0.78 % (w/w), which water compulsion were reduced weight lost 67.26 % (w/w). The color tone was orange brown compared by Adobe Photoshop RGB. Photoshop RGB Color mode uses the RGB model, assigning an intensity value to each pixel. In 8-bits-per-channel images, the intensity values range from zero (black) to 255 (white) for each of the RGB (red, green, blue) components in a color image. For fresh curry paste was fiery orange [9] R181, G95 and B 46 (red 71%, green 37%, blue 18%) and freeze dried curry paste was rich gold [9] R170, G 88, and B 31 (red 67%, green 35%, blue 13%) that was red intensity increasing after water evaporate removing (Fig. 3). The texture and water dissolubility of the curry were comparing shown in Figure 4.



Fresh curry paste | RGB (181, 95, 46) | Freeze dried curry paste | RGB (170, 88, 32)

Figure 3. The color comparison between fresh curry pastes were3 RGB (181, 95, 46) and freeze dry curry paste were RGB (170, 88, 32) using PhotoShop color scale.

fresh (L) and freeze dry (R) curry paste | water dissolubility freeze dry (L) and fresh (R)

Figure 4. Texture comparison and water dissolubility of fresh curry paste and freeze dry curry paste

3.2 Sensory evaluations of red curry paste

Tested 30 volunteers were performed screening of sweetness, saltiness, smelling, and color distinguishes comparison. Twelve of expert testers were obtained from the screening testing performance. They were capable to identify the comparison of sweetness, saltiness, smelling, and color distinguishes compared with the score 90-100% precision. The result analyzed that mean of paired samples t-test between individual fresh curry paste and freeze dried curry paste as color testing, odour testing, and taste testing respectively. A two-tail hypothesis were used the paired sample t-test hypotheses are formally defined below:

- The null hypothesis (H_0) assumes that the true mean difference (μ_d) is equal to zero.
- The two-tailed alternative hypothesis (H_1) assumes that μ_d is not equal to zero.

$$H_0 : \mu_{\text{fresh curry}} - \mu_{\text{freeze dry curry}} = 0$$

$$H_1 : \mu_{\text{fresh curry}} - \mu_{\text{freeze dry curry}} \neq 0$$

Statistical significance was determined by looking at the p-value. The p-value (α; 0.05) gives the probability of observing the test results under the null hypothesis. The lower the p-value, the lower the probability of obtaining a result like the one that was observed if the null hypothesis was true (Statistics

solutions. (2019) Paired Sample T-Test [8]. The result indicated that color comparison had 0.1911 p-value t-test, smell testing was 0.6742 p-value t-test, and taste testing was 0.7227 p-value t-test, which were higher than alpha (α, 0.05). The experiment should accept the null hypothesis (Table 1). The column chart (Fig. 5) was compare the mean of sensory evaluation between fresh and freeze dried curry paste.

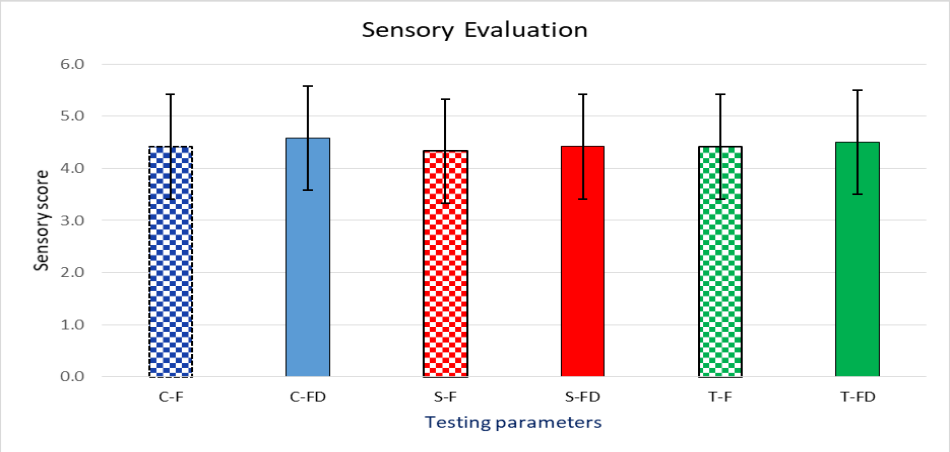


Figure 5. The column chart present sensory evaluation by plot mean of sensory score as color (fresh, C-F; freeze dry, C-FD), smell (fresh, S-F; freeze dry, S-FD), and taste (fresh, T-F; freeze dry, T-FD) The large checker board were fresh curry paste and solid fill were freeze dry curry paste.

Table 1. Comparative analysis of sensory evaluation between fresh curry paste and freeze dry curry paste

	Parameter	Mean	S.D.	t-test	p-value
Color	C-F; fresh	4.33	0.65	-1.3933	0.1911
	C-FD; freeze dry	4.58	0.51		
Smell	S-F; fresh	4.50	0.52	0.4318	0.6742
	S-FD; freeze dry	4.42	0.67		
Taste	T-F; fresh	4.33	0.49	0.3640	0.7227
	T-FD; freeze dry	4.25	0.75		

Non significance at the 0.05 level

The result of the chart in figure 5 and table 1 were performed analysis data of twelve expert trainer sensory evaluations. The trainer who were passing the 95% score of testing, which were precise and distinguish the evaluation of the color, odour, and taste. The color correlation between fresh curry paste (C-F) and freeze dry curry paste (C-FD) were not statistic significant (0.1911 p-value, 0.05 α) different by sensory evaluation. The smell testing had 4.50 average acceptable scores from 5.00 scores of fresh curry paste (S-F) and freeze dry curry paste (S-FD) got 4.42 average acceptable scores there were not statistic significant (0.6742 p-value, 0.05 α) different. Tested by tasting were 4.33 average acceptable scores of fresh curry paste (T-F) and 4.25 average acceptable score of freeze dry curry paste (T-FD) which were not statistic significant (0.7227 p-value, 0.05 α) different. The smell testing had 4.50 average acceptable scores from 5.00 scores of fresh curry paste (S-F) and freeze dry curry paste (S-FD) got 4.42 average acceptable score there were not statistic significant (0.6742 p-value, 0.05 α) different. Tested by tasting were 4.33 average acceptable scores of fresh curry paste (T-F) and 4.25 average acceptable score of freeze dry curry paste (T-FD) which were not statistic significant (0.7227 p-value, 0.05 α) different.

CONCLUSION

Thai red curry paste was an authentic Thai curry pastes need serious effort the paste was made by grinding the ingredients in a mortar and pestle and it takes over using fresh red chillies or dried chillies that have an earthy flavor. They are spicy because Thai chili peppers had analyzed about 50,000 – 100,000 SHU per one fruit [3]. The red curry paste still important for many Thai dishes for the Thai restaurants if its recipes aware from too spicy by reducing the curry paste it's could not originate taste of Thai foods. The products of these works were created red curry paste made from red bell pepper substitute Thai chili peppers which was reported that it contain a zero of SHU [3]. The advantages the way to really control amount of spicy level of Thai curry dishes without louse of the originated flavor. Furthermore, the freeze-dried technique was an effectiveness

technique for curry paste preservation. The confidence was confirmed through an acceptable score of sensory evaluation by expertise trained tester. The results of color, smell, and taste were not significant different (0.05, α) between fresh curry paste and freeze-dried curry paste.

The beneficial from this research could promote Thai food and helping the consumers who did not to eat too spicy Thai food and some menu could be served for small children or the patients who needed mild flavors. The freeze-dried curry paste could be long time preservation under seal vacuum envelope at room temperature. That reduced the weight and still fulfill of color, smell, and taste of authentic Thai curry pastes.

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