

RESEARCH PAPER

Standardization of *Acetes* Sandwich Preparation

Ajay E. Sonavane*, V.R. Joshi and J.M. Koli

Department of Fish Processing Technology and Microbiology, College of Fisheries Shirgaon, Ratnagiri-415629, Maharashtra, India

*Corresponding author: ajaysonavane7711@gmail.com

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Abstract

Acetes meat free of shell and moisture was prepared and developed the emulsion type product i. e. *Acetes* sandwich from *Acetes* meat. A level of squeezed *Acetes* meat (SAM) 75g, starch 15g, and 25g surimi gave a product of optimum quality characteristics, mouldability and stability than other levels. Addition of 20 g carrot was selected as it gave the best taste scores and overall acceptability as compared to beet root and amaranthus. Other ingredients standardized were salt 2 g, garam masala 6 g, red chilly powder 3 g, garlic paste 6 g, and ginger paste 1 g. Standardized pasteurization schedule was found thermal temperature at 100°C (steaming in autoclave) for 95 minutes.

Keywords: *Acetes* meat, pasteurization, surimi, *Acetes* sandwich

In Maharashtra, during the year 2011-12, 53,021 tons of *Acetes* shrimp was landed contributing 16.8% to the total marine fish landing in the state. As per the prevailing practice, maximum quantity of *Acetes* landed goes for drying and since it is a highly perishable maximum quantity of catch gets spoiled and used as such in fish meal production. The proximate composition (g/100) of fresh *Acetes* shrimp was found to be moisture 82.5, crude protein 12.7, crude fat 0.07 and ash 3.2. However, functional properties of protein in fresh *Acetes* are lost after it is dried. Hence, this necessitates the use of *Acetes* in fresh condition so as to utilize all the functional properties of *Acetes* protein to the maximum extent. Fresh meat of *Acetes* can be used for the preparation of *Acetes* mince, thereby, retaining their desired functional properties essential for Japanese style emulsion products such as fish *Chikurwa*, fish *kamaboko* and fish sausage. These products are highly nutritious well balanced, and

healthy as they are steamed. The *kamaboko* product after slicing in thin pieces is used as a sandwich in the bread slices. However, this product has white colour, elastic texture and bland taste. In order to improve the taste of the products suitable to Indian palate, an attempt has been made to incorporate red colour vegetables i.e. beet root, carrot and Amaranthus. These vegetables not only give higher nutritive value due to complementary effect of nutrients in combination with *Acetes* (Heen, 1962), but also impart attractive red colour to the product owing to their natural pigments which are safer than artificial dye colour. Few emulsion products have been developed using fresh *Acetes* viz cooked and dried products (Damle *et al.* 1989), *Acetes*-fish fingers (Patil, 2007) and *Acetes* meat sausage (Nagothkar, 2013). Since no work has been done on *Acetes* sandwich (i.e. *Acetes kamaboko*), an attempt is made in the present study to standardize the preparation of *Acetes* sandwich.

Material and Methods

The fresh *Acetes* immediately after catch was procured from landing center and by catch fishes, other animals and plants were removed. Whole *Acetes* was weighed and subjected to shell separation by putting in meat separator to separate shell and meat. Then, the separated meat was subjected to squeezing in the thin synthetic cloth to remove excess liquid (Moisture + Solids).

Separated and squeezed *Acetes* meat (100 g) was mixed with salt (2 g) and ground. This paste was moulded into shape of ball and steamed for 30 min. at 100°C. Further, balls were cooled and observed for emulsion formation and stability.

Separated squeezed *Acetes* meat was ground for 2 min. and mixed with salt and again ground for 2 min. and divided into six lots. Each lot was mixed with respective level of starch viz. 0 g, 5 g, 10g, 15 g, 20 g and 25 g. Mixed paste was moulded into ball shape and subjected to steaming for 30 min. at 100°C. and following cooling, the ball so prepared were subjected

to folding test (Suzuki, 1981) and visual observation.

Standardization of pasteurization of *Acetes* sandwich was carried out using the method and recipe of Farnandes (2001), but with slight modification as shown in Flow chart 1 and Table no 1. In place of fish surimi, a combination of *Acetes* meat (75 g) and surimi (25 g) was used. Carrot (cleaned, cooked and ground) was used at a tentative level of 30%. The size of *Acetes kamaboko* was 4 × 5 × 6 cm. (L × W × H). Combination of modified and ordinary starch was used in the ratio of 50:50. *Acetes* meat was ground in the silent cutter for 2 min, salt was added and continued grinding for 2 minute then all the ingredients were added in sequence and continued grinding for 12 min. The ground *Acetes* paste was stuffed to a pouch, that was sealed and placed in the mould and the tip of thermocouple was fixed at the coldest spot i.e. geometric center of sandwich. The sandwich was steamed at 100°C (0 psi) and temperature was noted down at cold spot of the *Acetes kamaboko* at an interval of 5 minute till it reached processing temperature of 85°C, and continued steaming for 30 minutes and the product was taken out and cooled in chilled water

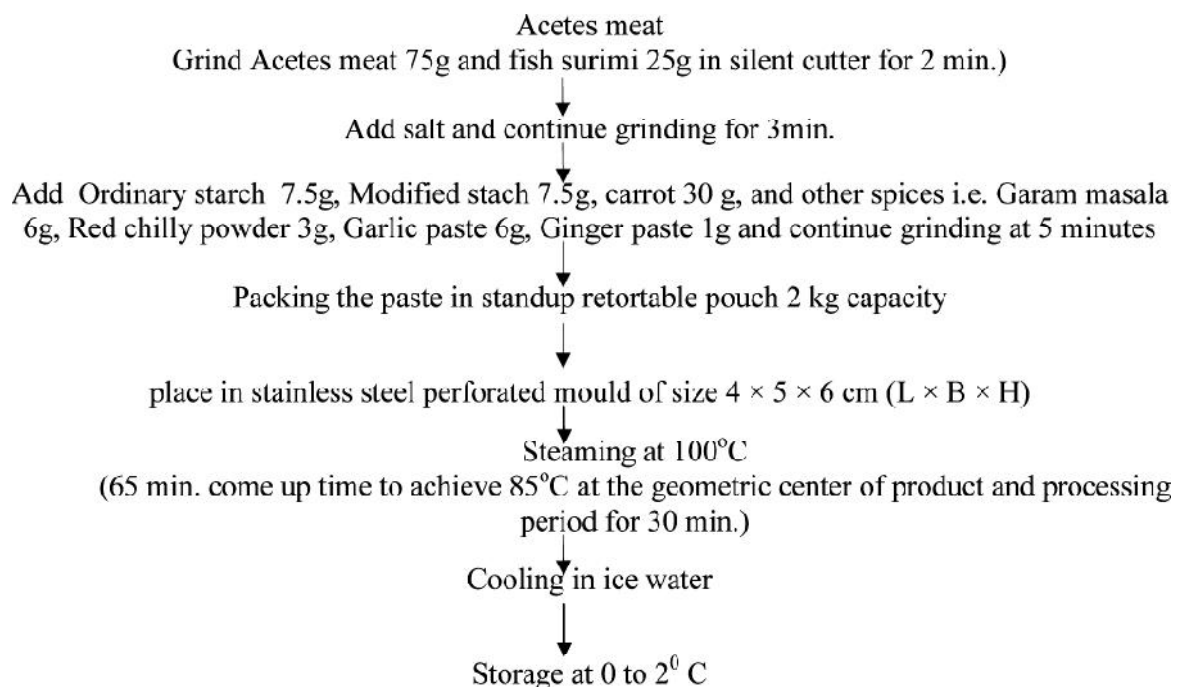


Fig. 1: Standardized method of preparation of Acetes Sandwich

to 0°C. Pasteurization at 100°C was chosen as the elasticity of the Japanese style fish paste products is affected when the temperature exceeds 100°C (Suzuki, 1981). The entire process is depicted in flow diagram and the standardized recipes of the product is given in Table 1.

Table 1: Standardized recipe of Acetes sandwich

Ingredients	Quantity (g)
Acetes meat	75
Surimi	25
Corn flower	15
Salt	2
Garam Masala	6
Red chilly powder	3
Garlic paste	6
Ginger paste	1
Carrot	20
Total	153

Acetes sandwich was prepared as per the method given in flow chart (Fig. 1) and (Table 1) Acetes sandwich paste was divided into six batches at different levels (Table 2) of ingredients (0g, 5g, 10g, 15g, 20g and 25g) of carrot were added as per the respective batches and continued further grinding for 5 min. All the other ingredients were kept constant.

Table 2: Total treatment with different concentration levels

Treatments	Ingredients	Levels				
		A	B	C	D	E
Treatment 1	Acetes meat	75	75	75	75	75
Treatment 2	Surimi	25	25	25	25	25
Treatment 3	Corn flower	5	10	15	20	25
Treatment 4	Salt	1	2	3	4	5
Treatment 5	Garam Masala	4	5	6	7	8
Treatment 6	Red chilly powder	2	3	4	5	6
Treatment 7	Garlic paste	4	5	6	7	8
Treatment 8	Ginger paste	1	2	3	4	5
Treatment 9	Carrot	5	10	15	20	25

The Acetes sandwich was steamed at 100°C of 90

minutes, as standardized above. Acetes Sandwich so prepared was subjected to sensory evaluation using 10 trained panel and 9 point hedonic scale the organoleptic data were subjected to statistical analysis. Same procedure along with same levels, was followed for other two vegetables i.e. beet root and amaranthus. Three types of sandwich were prepared as above using standardized levels of carrot (20g), beet root (10g) and amaranthus (20g) and subjected to organoleptic evaluation. Five types of sandwich were prepared as above using different levels of salt viz. 1g, 2g, 3g, 4g and 5g, keeping other ingredients constants and subjected to organoleptic evaluation. For standardization of other ingredients, the same procedure was followed as for salt but with different levels of ingredients, garam masala (4g, 5g, 6g, 7g and 8g), red chilly powder (2g, 3g, 4g, 5g and 6g), garlic paste (4g, 5g, 6g, 7g and 8g) and ginger paste (1g, 2g, 3g, 4g and 5g).

Results and Discussion

The results of biochemical and microbiological characteristics of raw Acetes are presented in Table 3. It can be seen that TVB-N values of fresh Acetes and squeezed separated Acetes were found to be 9.1 mg N% and 9.4 mg N% respectively and TMA-N values of fresh Acetes and squeezed separated Acetes were found to be 0.31mg N% and 0.33 mg N%, respectively. Total plate count (TPC) of fresh Acetes and squeezed separated Acetes were found to be 4.1×10^4 and 5.2×10^4 CFU/g, respectively. The result indicated that Acetes spp. used in the present study were fresh as per the limit set for TVB-N, TMA-N and TPC (Conell, 1995).

Table 3: Biochemical and microbiological characteristics of raw Acetes

Sample	pH	TVB-N (mg -N %)	TMA-N (mg -N %)	TPC (cfu/g)
Whole Acetes	7.5	9.1	0.31	4.1×10^4
Squeezed Separated Acetes meat	7.5	9.4	0.33	5.2×10^4

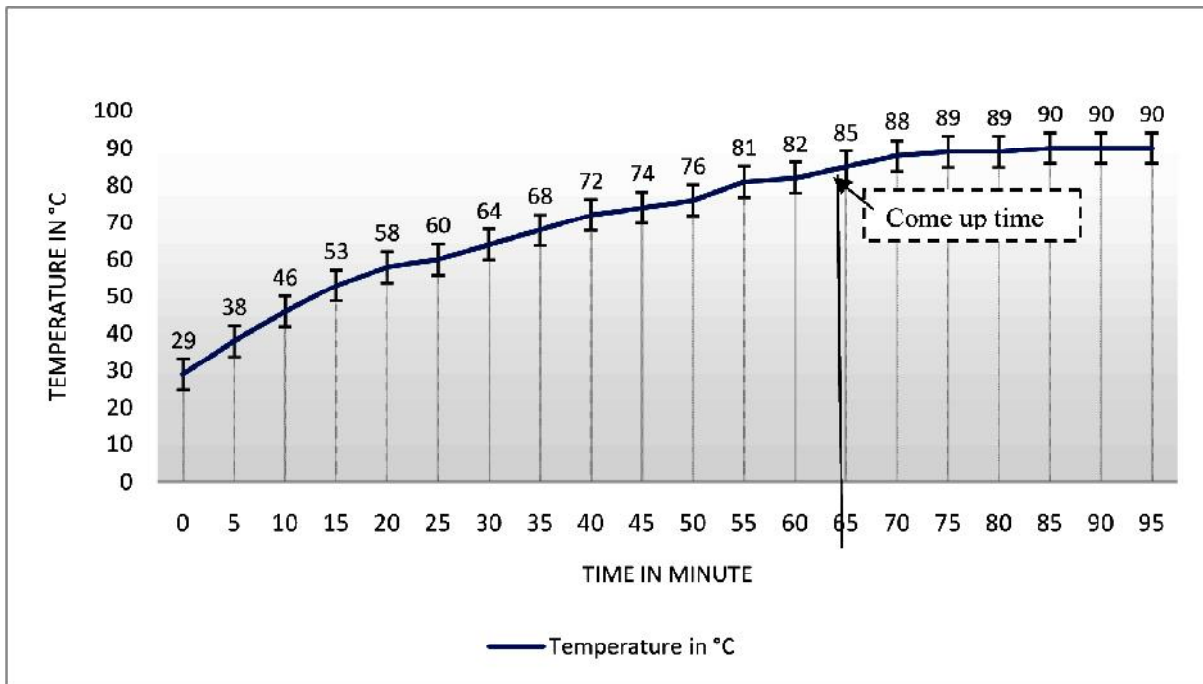


Fig. 2: Standardization of pasteurization of *Acetes* sandwich

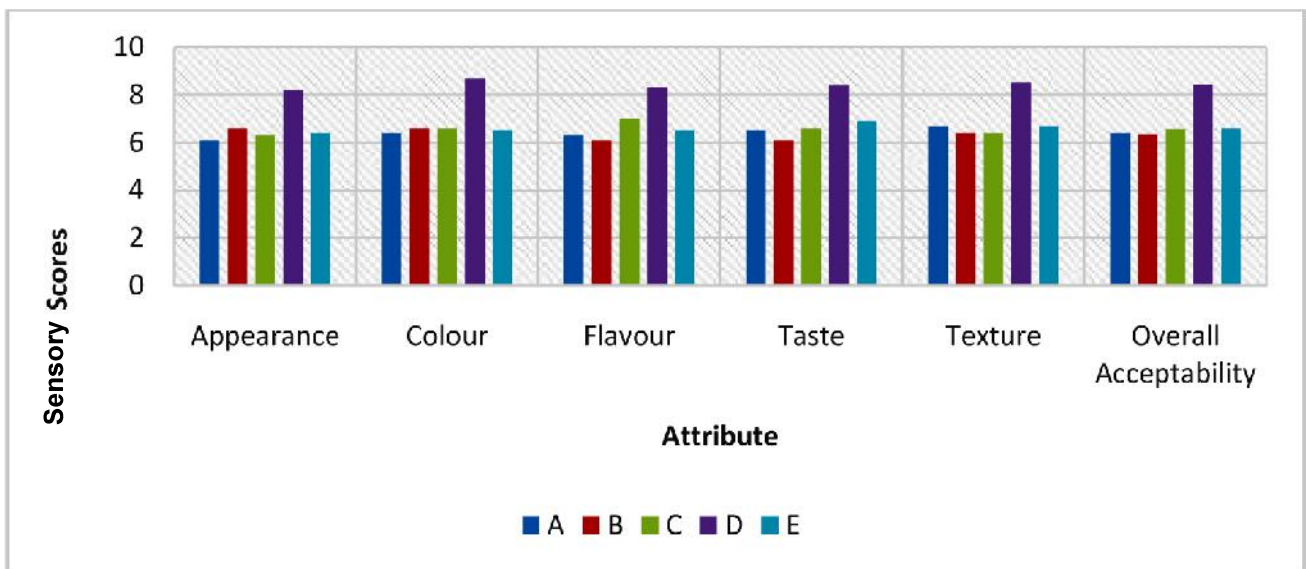


Fig. 3: Effect of different levels carrot on sensory characteristics of *Acetes* sandwich

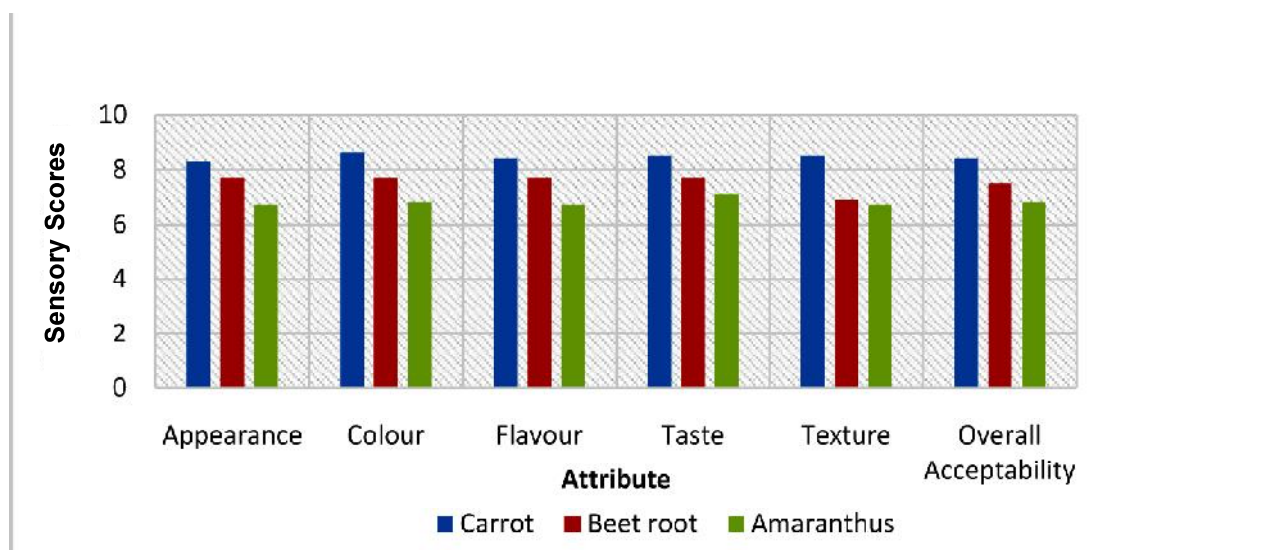


Fig. 4: Selection of suitable vegetables among the three vegetables on sensory characteristics of *Acetes* sandwich

The results of TVB-N were similar to those reported by Patil (2000) for raw *Acetes* spp. (8 mg N %), Suzuki (1981) for krill meat (0.5 to 6 mg N %), Zynudheen *et al.* (2005) and Pravin Kumar (2006) for *Acetes* ground meat 14.0 mg N % and 10.2 mg N %, respectively, and Nagothkar (2013) for raw whole *Acetes* 9.3 mg N % and squeezed separated *Acetes* meat 9.8 mg N %..

Acetes meat and salt ground mixture could be moulded however, there was release of water after steaming. This may be due to higher moisture content and lower water holding capacity after gelling. Similarly results have been documented by Patil (2007) during the preparation of documented *Acetes* fingers. Among the different levels of starch tried, it was observed that the stability and mouldability were found to be equally good in all the levels with no indication of oozing of water, however resulted in poor gel strength. To achieve good gel strength, a combination of 75 g *Acetes* meat, 25 g surimi and 15 g starch along with other ingredients was necessary.

The temperature at the geometric center of the *Acetes* sandwich (Fig. 2) reached 85°C after 65 min and processing period i.e., steaming at 100°C (0 psi) was fixed for 30 min and immediately, there after sandwich was put into the ice water to cool to 0°C.

Tanikawa *et al.* (1971) have reported destruction of thermo tolerant bacilli at 100°C for 30 min. Further, the Ministry of Welfare of Japan has stipulated that the temperature in the center of the *kamaboko* product must be higher than 75°C during heating (Suzuki, 1981). Microbial heat stable enzymes and toxins are however, not destroyed unless a food is heated for 30 min. at longer at or above 90°C (Bibek Ray, 2004).

Among the five levels of carrot used, levels of 20 g carrot improved the sensory scores significantly ($p < 0.05$) as compared to the other levels. However, Fernandes (2001) reported that fish *kamaboko* (sandwich) prepared with a level of 30 g carrot was found to be suitable organoleptically. The difference may be due to the difference in colouration of fish surimi and *Acetes* meat (Astaxanthin pigments). Among the three types of vegetables viz. carrot, beet root and amaranthus, carrot was found more suitable and improved the scores significantly ($p < 0.05$) as compared to the beet root and amaranthus. Among the different levels of ingredients tried, a level of 2 g of salt, 6 g of *garam masala*, 3 g of red chilly powder, 6 g of garlic and 1 g of ginger was more acceptable with respect to the taste scores and overall acceptability as compared to other levels, tried.

Conclusion

Preparation of *Acetes* sandwich was standardized in respect of ingredients squeezed *Acetes* meat (SAM) 75g, starch 15g, and 25g surimi, 20 g carrot, salt 2 g, *garam masala* 6 g, red chilly powder 3 g, garlic paste 6 g, and ginger paste 1 g and pasteurization schedule was found to be 100°C (steaming in autoclave) for 95 minutes.

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