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Abstract. The food production process uses a lot of synthetic dyes. Processing of salted quail eggs using natural dyes is still limited. Secang wood (*Caesalpinia sappan L.*) is a natural coloring agent and its use is still limited. This study aimed to explain the effect of adding secang wood to the sensory characteristics of salted quail eggs. This study used a 3 x 3 factorial completely randomized design (CRD) with 3 replications. Factor A was the level of addition of secang wood powder: 10%, 20% and 30%, respectively. Factor B curing time was 3 days, 6 days and 9 days. The parameters measured were sensory characteristics: color, scent of egg, taste and texture of salted quail eggs. The results showed that the level of addition of secang wood powder and different curing time had no significant effect ($P>0.05$) on color. Thus, the level of addition of secang wood did not show a significant effect on the scent of egg, taste and texture of salted quail eggs. However, the duration of curing showed a significant effect ($P<0.05$) on the scent of egg, taste and texture of the resulting salted quail eggs. The addition of 20% secang wood powder and curing 6 days improved the sensory characteristics of salted quail eggs.

1. Introduction

Quail is one type of aves that is widely available in Indonesia, especially the strain *Coturnix coturnix japonica L.* [1]. The nutritional value of quail eggs is not inferior to other poultry eggs, so that it can increase the variety in the provision of animal protein sources. In general, the content of quail eggs consists of 47.4% egg white (albumen), 31.9% egg yolk (yolk) and 20.7% shell and shell membrane. The protein content of quail eggs is around 13.1%, while the fat content of quail eggs is around 11.1% [2]. Eggs will experience a change in the direction of damage such as evaporation of moisture through the pores of the eggshell which results in reduced egg weight, changes in chemical composition and dilution of egg contents after this time [3]. Salting is one of the popular methods used to extend the shelf life of eggs [4]. The addition of secang wood powder (*Caesalpinia sappan L.*) to salted quail eggs can be used as one of the uses for food coloring which is applied to salted egg production technology.

Color is an important factor that is first seen by consumers, because color provides an attraction for consumers [5]. Secang wood plants contain chemical flavonoids, brazilians, alkaloids, saponins, tannins, phenyl propane and terpenoids [6]. Of these components the most interesting is the dye. Secang wood produces a red pigment called brazilin. This pigment has a sharp, bright red color at neutral pH (pH = 6–7) and shifts towards purplish red as the pH increases. At low pH (pH = 2–5) brazilin has a yellow

color [7]. Therefore, this study aimed to determine the effect of adding secang wood powder (*Caesalpinia Sappan L.*) and curing time on the sensory characteristics of salted quail eggs.

2. Materials and methods

2.1. Materials

Fresh quail eggs (*Coturnix coturnix japonica L.*) one day old were obtained from local breeders in Lempengan village, Maros Regency.

2.2. Preparation of salted quail eggs

Eggs were marinated with a coating of salt paste coating. One quail egg required about 14 g of salt paste agent plus ±11 ml of water. The percentage of rubbing ash and red brick powder was based on the amount of salt paste dispenser for a number of egg treatment units. Addition of secang wood powder (10%, 20%, 30%) of the weight of the salt paste coating used. Furthermore, the mixture was smeared on the entire surface of each treatment unit. After the laying stage was complete, treatment quail eggs were stored for 3 days, 6 days and 9 days and each treatment (curing time) was boiled and tested.

2.3. Organoleptic test procedure

The number of panelists in this study were 15 semi-trained panelist categories. Panelists filled out a test sheet to assess the sample presented. Sample presentations were placed in front of each panelist. Furthermore, the assessment was made based on the color, flavor, taste, and texture of the salted quality eggs. Determination of value was done by using a structured scale. Color score indicated a level of yellow color of eggs (1=not yellow, 5=very yellow). The Flavor score indicated the flavor of (1= very fishy, 6= not fishy). Taste score indicated the taste of fishy (1= very fishy, 6= not fishy). Texture score indicated the taste of fishy (1= very salty, 6= not salty).

3. Results and discussion

3.1. Color values

The results of the color of salted quail eggs with the addition of powdered secang wood (*Caesalpinia Sappan L.*) and curing time were presented in table 1.

Table 1. The color score of salted quail eggs with the addition of secang wood powder and curing time.

Duration of Curing (d)	Addition of secang wood powder (%)			Average
	10	20	30	
3	4.53±0.30	4.43±0.20	4.36±0.15	4.44±0.21
6	4.56±0.32	4.56±0.20	4.43±0.15	4.52±0.21
9	4.46±0.30	4.73±0.25	4.56±0.30	4.58±0.27
Average	4.52±0.27	4.57±0.23	4.45±0.20	4.51±0.23

Description: 1 = not yellow, 2 = slightly yellow, 3 = somewhat yellow, 4 = yellow, 5 = very yellow.

The results of the analysis of variance showed that the addition of secang wood powder and curing time and the interaction had no significant effect ($P>0.05$) on the color score of salted quail eggs. Color Score A fresh yolk has a yolk color from yellow to orange. The food consumed has a direct effect on egg yolk color (containing yellow pigment) [8]. Curing using a dough from ashes will produce salted eggs with a pale yolk and the edges of the yolk will be blackish (gray). Curing using a dough from bricks will produce salted eggs with a reddish yolk color and a gritty taste (masir) [9]. In this study, the color of salted quail eggs ranged from 4.45 to 4.52 (colored yellow) for all samples and did not change significantly during the curing time ($P>0.05$). The color of the salted quail eggs given secang powder during curing did not affect the color due to the natural properties of the secang. Secang wood produced

a red pigment called brazilin. This pigment has a sharp, bright red color at neutral pH (pH = 6–7) and shifts towards purplish red as the pH increases. At low pH (pH = 2–5) brazilin has a yellow color [7]. Secang wood can be used as a natural dye and preservative. The use of secang wood was expected to replace synthetic dyes that were harmful to health [9]. Secang wood when boiled will give a pink color. Secang wood was also efficacious as a preservative, antioxidant and antibacterial so that it can reduce bacteria in food.

3.2. Flavor values

The results of the flavor of salted quail eggs with the addition of powdered secang wood (*Caesalpinia sappan L.*) and curing time were presented in table 2.

Table 2. The flavor score of salted quail eggs with the addition of secang wood powder and curing time.

Duration of Curing (d)	Addition of secang wood powder (%)			Average
	10	20	30	
3	4.70±0.10	4.56±0.15	4.63±0.15	4.63±0.13[ab]
6	4.56±0.32	4.56±0.20	4.43±0.15	4.52±0.21[a]
9	4.66±0.32	4.86±0.11	4.83±0.05	4.78±0.19 [b]
Average	4.64±0.24	4.66±0.20	4.63±0.20	4.64±0.21

Different superscripts in the same column showed a significant difference (P< 0.05) (1 = very sweet, 2 = sweet, 3 = somewhat sweet, 4 = slightly sweet, 5 =not sweet).

The analysis of variance showed that the addition of secang wood powder did not affect the aroma of salted quail eggs. Meanwhile, the duration of ripening had a significant effect (P>0.05) on the aroma of salted quail eggs. The interaction between the addition of secang wood powder and curing time did not change the aroma of salted quail eggs much. This means that the effect of adding secang wood powder does not depend on the curing time of salted quail eggs.

The results showed that the flavor value for 3 days of curing time was significantly higher than 9 days, but it was not different from the duration of curing 6 days. On the other hand, the 9 days of ripening significantly increased the aroma of salted quail eggs. This was probably because the wood was almost odorless. In line with the research Nirmagustina et al (2011), that secang wood did not have an aroma, so that the secang drink has no aroma. In this study, the aroma of salted quail eggs was well-received by all the panelists [10]. Besides the color, the flavor of food played an important role in food or agricultural products that was required attractiveness, recognition, and quality attributes [11].

The interaction between the addition of secang wood powder and curing time in this study did not affect the flavor and color of salted quail eggs. During the curing process, the color of the secang wood only spreads over the surface of the eggshell and did not physically affect the albumen and yolk. Thus the distinctive smell of salted quail eggs was still common in panelists. That quail eggs were suitable for salting because the fishy aroma of the eggs will be reduced by salting [12].

3.3. Taste values

The results of the taste of salted quail eggs with the addition of powdered secang wood (*Caesalpinia Sappan L.*) and curing time were presented in table 3.

The analysis of variance showed that the addition of secang wood powder had no significant effect (P<0.05). Meanwhile, the duration of ripening has a significant effect on the taste of salted quail eggs. The interaction between the addition of secang wood powder was independent of and not related to the duration of ripening and did not change the taste of salted quail eggs.

Table 3. The taste score of salted quail eggs with the addition of secang wood powder and curing time.

Duration of Curing (d)	Addition of secang wood powder (%)			Average
	10	20	30	
3	4.06±0.15	4.13±0.25	4.36±0.25	4.18±0.23[a]
6	4.66±0.51	4.73±0.23	4.56±0.37	4.65±0.34[b]
9	4.63±0.35	4.80±0.20	4.66±0.23	4.70±0.24[b]
Average	4.45±0.43	4.55±0.37	4.53±0.28	4.51±0.35

Different superscripts in the same column show significant differences (P <0.05).
(1 = very salty, 2 = salty, 3 = slightly salty, 4 = slightly salty, 5 = not salty).

The results showed that the taste value of salted quail eggs at 9 days of cooking time was significantly higher than 3 days, but not different from the 6 days of immersion. On the other hand, the duration of ripening increased the taste value of salted quail eggs so that the taste becomes less salty. This showed that the longer the curing time, the less salty taste of the quail eggs. This may be due to the distinctive bitter taste of salted quail eggs due to the tannin content in the secang wood powder used as a dye in this study. Tannins reported have a characteristic strong bitter taste [13]. This happens because of the saponin and tannin content in secang wood. The results of this study were in line with Puspitasari (2012) that adding too much secang wood extract can cause a bitter taste, this bitter taste arised saponin content in secang so it was necessary to vary the concentration of addition of secang extract to dodol arrowroot [14]. The results of the research Srinivasan et al (2012) showed that secang wood has chemical content in the form of steroids, tannins, phenols, saponins, and flavonoids which can be used as antibacterial [15]. Research Saravanakumar and Chandra (2013) showed that methanol extract and ethanol extract from *C. sappan* L have chemical contents including flavonoids, phenolics, tannins and saponins [16].

The interaction between the addition of secang wood powder and the duration of curing in this curing has no significant effect. Thus, the panelists still felt the distinctive taste of salted quail eggs. This was because the salty taste of the eggs was influenced by the amount of salt that entered the eggs after the salt ionizes into $Nations^{+}$ and CI^{-}. The taste of salted eggs generally tastes salty, according to the level of salt in the manufacture of salted eggs and the duration of curing [16].

3.4. Texture values

The results of the texture of salted quail eggs with the addition of powdered secang wood (*Caesalpinia Sappan L.*) and curing time were presented in table 4.

Table 4. The texture score of salted quail eggs with the addition of secang wood powder and curing time.

Duration of Curing (d)	Addition of secang wood powder (%)			Average
	10	20	30	
3	4.90±0.10	4.96±0.15	4.93±0.11	4.93±0.11[a]
6	4.43±0.35	4.56±0.37	4.86±0.23	4.62±0.34[b]
9	4.73±0.11	4.83±0.05	4.83±0.20	4.80±0.13[ab]
Average	4.68±0.28	4.78±0.27	4.87±0.17	4.78±0.24

Different superscripts in the same column show significant differences (P<0.05) (1 = very chewy, 2 = chewy, 3 = somewhat chewy, 4 = a little chewy, 5 = not chewy).

The results of the analysis of variance showed that the curing time had a significant effect (P<0.05) on the texture score of salted quail eggs. Duncan's test showed that the duration of curing 9 days did not significantly affect the texture of salted quail eggs at 3 and 6 days of curing time. However, the duration of ripening has significantly changed the texture of the quail salted eggs.

The results showed that the curing duration of 3 days was significantly higher than that of 6 days, but did not differ from the duration of curing for 9 days. On the other hand, the 3 and 6 days ripening

significantly increased the texture value of salted quail eggs. This was because the red brick powder has a better water binding ability so that the diffusion process goes well, similar to the opinion Susi and Lesmayati (2014) stated that chewy eggs white were influenced by water content [17]. Texture factors included hand feeling, tenderness, ease of chewing and the crunchiness [18].

The interaction between the addition of secang wood powder and curing time in this study had no significant effect. During the process of wrapping the secang wood powder with a curing time of 3 days, 6 days and 9 days, it turned out that the secang powder content could not get into the eggs so that the texture of the eggs was a bit chewy. According to Meilgaard et al (2000), there was a strong bond between tannins and proteins which caused the protein to coagulate so that the texture of the eggs getting chewier [19]. The results of the research by Nuruzzakiah et al (2016) showed that secang wood has chemical content in the form of steroids, tannins, phenols, saponins and flavonoids which can be used as antibacterial [20].

4. Conclusion

The results showed that the color, aroma, taste, and texture with a curing time of 9 days were still favored by panelists. The addition of 20% secang wood powder and curing 6 days improved the sensory characteristics of salted quail eggs.

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