



Utilization Of Gambier Leaf Extract (*Uncaria gambir Roxb*) As A Chicken Meat Preservative

N. E. Nasution¹, Yunilas^{1*}, N. Ginting¹ and Y. Khairani²

¹Animal Production Program Study, Faculty of Agriculture, University of North Sumatra, Padang Bulan, Medan 20155, Indonesia

²University Gadjah Mada, Yogyakarta

*Correspondent author: yunilas@usu.ac.id

Abstract. Gambier leaf extract is a latex extract from the leaves of the gambier plant and contains catechin compounds that act as antimicrobials. In order to increase the shelf life and minimize the use of synthetic chicken meat preservatives, this study was carried out with the aim of knowing the administration of gambier leaf extract (*Uncaria gambir Roxb*) as a chicken meat preservative. This study used a factorial 3 x 5 completely randomized design (CRD) with 3 replications. Factor I is various doses of gambier leaf extract, namely E1 (1% gambier leaf extract with aquadest solvent), E2 (1% gambier leaf extract with Castrol oil, tween and aquadest solvents), E3 (2% gambier leaf extract with Castrol oil solvent, tween and aquadest) and Factor II is the length of fermentation (1 day, 2 days, 3 days, 4 days and 5 days). Variables observed included air content (highest yield at concentration E2 = 77.56), Ph (highest yield at concentration E2 = 5.57), and total microbes (highest yield at concentration E = 7.73 CFU/g). The results showed that the dose of gambier leaf extract had no significant effect ($P>0.05$) on the water content and pH of chicken meat, but had a very significant effect ($P<0.01$) on the total microbial meat. Storage time had no significant effect ($P>0.05$) on water content, pH and the number of microbes in chicken meat. There was no interaction between the dose of gambier leaf extract and storage time.

Keywords: antimicrobial, catechins, chicken meat, doses, gambier leaf extract

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1. Introduction

Meat is defined as all animal tissues and their processed products that can be eaten and do not cause health problems for those who eat them [1]. While defined meat as tendons (muscles) attached to the skeleton, except for the tendons of the lips, nose, and ears, which came from healthy animals when slaughtered [2]. Stated that animal muscles turn into meat after slaughter because their physiological functions have stopped. Muscle is the main component of meat. Muscle contains about 75% water, 19% protein, 3.5% non-protein substance, and 2.5% fat [1].

Formalin has the ability to preserve food because of the aldehyde group which is easy to react with proteins to form methylene compounds -NCHOH. Thus, when protein foods are watered or soaked in formalin solution, the aldehyde group of formaldehyde will bind to protein elements. The bound protein cannot be used by spoilage bacteria, so the formalinated food will last longer. In addition, proteins with the structure of methylene compounds cannot be digested [3]. Government through

Minister of Health Regulation No. 1168/1999 has banned the use of formalin as a food preservative. However, a number of food products containing formalin were still found [4].

Food preservative is basically an attempt to suppress the growth of microbes in food. Research by proved that the addition of active ingredients from local plants was able to suppress microbial growth in food [5] [6] [7].

Gambir leaves contain functional compounds that are included in the class of polyphenolic compounds, one of which is catechins. Gambir leaves with catechin content are able to act as an antibacterial with the ability to damage the membrane and or cell wall of bacteria, thereby disrupting the permeability of the cell. Cells cannot carry out living activities due to impaired permeability, so that their growth is inhibited or even dead. In addition, catechins also have antibacterial power by precipitation of proteins, because catechins have the same effect as phenolic compounds. With the presence of functional compounds in the polyphenol group in gambier leaves, it is suspected that it can inhibit the growth of spoilage bacteria so that it can preserve meat (prolong shelf life).

Based on the explanation above, the writer is interested in examining the effect of using gambir leaf extract (*Uncaria gambir Roxb*) as a meat preservative.

2. Materials and Method

2.1. Materials

The raw materials used in this study were gambir leaves and broiler chicken meat, 70% alcohol, castor oil, and tween obtained from a chemical store in Medan while gambir leaves were obtained in West Pakpak District.

2.2. Methods

The study was carried out experimentally using a factorial completely randomized design (CRD), dose of gambir leaf extract (factor 1) and storage time (factor 2) with 3 replications. The treatment given is as follows:

Factor 1. Various doses of gambier leaf extract

E1 = 1% gambier leaf extract with aquadest solvent

E2 = 1% gambier leaf extract with Castrol oil, tween and aquadest as solvents

E3 = 2% gambier leaf extract with Castrol oil, tween and aquadest as solvents

Factor 2. Storage time

W1 = 1 day

W2 = 2 days

W3 = 3 days

W4 = 4 days

W5 = 5 days

3. Results and Discussion

3.1. Water content

Table 1. Effect of water content with the dose of gambier leaf extract (1% (control), 1% and 2%) on the length of storage of chicken meat.

Dose (E)	Storage Time (W)					Average
	W1	W2	W3	W4	W5	
E1 (1%) control	76,39	78,55	78,2	78,69	78,22	77,25 ^{tn}
E2 (1%)	76,7	77,71	77,27	78,62	77,87	77,56 ^{tn}
E3 (2%)	76,84	77,43	77,39	77,4	78,53	77,52 ^{tn}
Average	76,59 ^a	77,47 ^{ab}	77,36 ^{ab}	77,84 ^b	77,94 ^b	

Note: Different superscripts on dosage and storage time showed no significant difference in Duncan's test ($p < 0.05$).

In the results of this study, chicken meat had no significant effect, but the results of the analysis of variance on the calculation of water content data. the amount of water content of meat in testing the nutritional content of meat was also not significantly different "Table". The higher the water content, the faster the growth rate of microorganisms in the meat. This is because the high water content will affect the water activity (a_w) of the meat. States that water activity (a_w) is the amount of free water that can be used by microorganisms for growth [8]. This statement is also supported, that the factors that can affect microbial growth are nutrients, water availability, pH value, temperature, and availability of oxygen [9].

3.2 pH value

Based on the results of research on the pH value of chicken meat that has been soaked in a solution of gambier leaf extract, it can be seen from “Table 2”.

Table 2. Various doses of gambier leaf extract and storage time on the pH of chicken meat

Dose (E)	Storage Time (W)					Average
	W1	W2	W3	W4	W5	
E1 (1%) control	5,40	5,53	5,53	5,43	5,63	5,51 ^{tn}
E2 (1%)	5,57	5,57	5,50	5,47	5,60	5,52 ^{tn}
E3 (2%)	5,53	5,57	5,57	5,43	5,33	5,57 ^{tn}
Average	5,50 ^{tn}	5,52 ^{tn}	5,57 ^{tn}	5,57 ^{tn}	5,57 ^{tn}	

Note: Different superscripts at the same dose and storage time showed no significant difference in Duncan's test ($p < 0.05$).

The results of the analysis of variance showed that the administration of various doses of gambir leaf extract and storage time had no significant effect ($P > 0.05$) on the water content of the meat and there was no interaction. It can be seen from “Table 2” that chicken meat that has been given a solution of gambir leaf extract (*Uncaria gambir Roxb*) does not have a real influence because the surface temperature of the water rises, the solubility of carbon dioxide will decrease so that the pH will rise and the water is alkaline, meanwhile, as the temperature and temperature decrease, the surface temperature of the water will also decrease and automatically the solubility of carbon dioxide will be higher. This is in accordance with the statement of which states that the pH value of chicken meat is quite high but is still below the pH value of food products recommended by the Indonesian National Standard (SNI) which is 6-7. which affects the two basic ingredients, namely, chicken meat and extracts are not different so that the storage time of broiler chicken meat is not different from the pH of chicken meat [10].

3.3 Total Microbes

The results of the study of giving gambir leaf extract (*Uncaria gambir Roxb*) on total microbes with a concentration of 1% (control), 1% and 2% as a preservative for chicken meat and the length of storage of meat can be seen from the table as follows:

Table 3. Effect of various doses of gambir leaf extract and storage time on total chicken meat bacteria (CFU/g x 10⁶) which has been converted to logarithmic transformation

Dose (E)	Storage Time (W)					Average
	W1	W2	W3	W4	W5	
E1 (1%) control	6,34	7,28	7,31	7,68	7,70	7,26 ^b
E2 (1%)	7,07	5,81	6,81	6,45	6,37	6,51 ^a
E3 (2%)	7,64	7,71	7,71	7,81	7,81	7,73 ^c
Average	7,01 ^{tn}	6,93 ^{tn}	7,27 ^{tn}	7,31 ^{tn}	7,29 ^{tn}	

Note: Different Superscriptions at the same dose and storage time showed a very significant difference in Duncan's test ($p < 0.05$).

Bacterial growth in each chicken meat mixed with gambir leaf extract for each treatment showed different total bacteria results. The presence of the concentration of gambir leaf extract with E2 treatment gave a more effective effect than the addition of gambir leaf extract at concentrations of E1 and E3. The difference in total bacteria also is influenced by the storage of chicken meat so that it is not easily contaminated. Stated that gambir leaves contain bioactive components that act as antimicrobials, so that they can be used for preservatives and agricultural plant medicines/vegetable pesticides [11]. The potential ingredients are gambir leaves containing 7-33% catechin, 20-55% catechu tannic acid, 2-4% quercetin, 3-5% red catechu, alkaloids, 1-2% fixed oil and 20-30% prycatechol.

4. Conclusion

Giving gambir leaf extract (*Uncaria gambir Roxb*) at a dose of 1% with Castrol oil, tween and aquadest solvents, can preserve chicken meat for up to 5 days of storage and gambir leaf extract can help inhibit the growth of microorganisms.

REFERENCES

- [1] Soeparno. 2005. Ilmu dan Teknologi Daging. Cetakan Ke-4. Gajah Mada University Press, Yogyakarta. Suardana, I W. Dan Swacita, I. B. N. 2009. Higiene Makanan. Udayana Uiversity Press, Denpasar, Bali.
- [2] Muchtadi, Tien R., Syugiyono, Fitriyono Ayustaningwarno. 2010. Ilmu Pengetahuan Bahan Pangan. Alfabeta.
- [3] Siti Nurkhamidah, ST, MS, Ph.D., Prof. Dr. Ir. Ali Altway, MS., Prof. Dr. Ir. Sugeng Winardi, M.Eng., Prof. Dr. Ir. Achmad Roesyadi, DEA., Dr. Yeni Rahmawati, ST, MT., Dr. Siti Machmudah, ST, M.Eng., Dr. Widiyastuti, ST, M.Eng., Dr. Tantular Nurtono, ST, M.Eng, Dr. Siti Zullaikah, ST, MT., Dr. Lailatul Qadariah, ST, MT. 2017. Identifikasi Kandungan Boraks Dan Formalin pada Makanan Dengan Menggunakan Scientific Vs Simple Methods. Jurnal Pengabdian Pada Masyarakat LPPM-ITS Surabaya.
- [4] Sinta Ratna Dewi. 2019. Identifikasi formalin pada makanan menggunakan ekstrak kulit buah naga. Jurnal Nasional Ilmu Kesehatan. Vol. 2 Edisi 1, p 45-51.

- [5] Astawan, Made. 2008. Sehat dengan Hidangan Hewani. Jakarta : Penebar Swadaya.
- [6] Afiyah, Dyah Nurul. 2013. "Microbiological Properties of Beef Sausage with Addition of Teak Leaf Extract (*Tectonagrandis*) During Cold Storage." Essay. Bogor : Department of Animal Production Science and Technology. Faculty of Animal Husbandry, Bogor Agricultural University.
- [7] Melda, Fitriani. 2013. Total bacteria, PH, and moisture content of broiler chicken meat after soaking with extract of senresidenan leaves (*Melastoma malabathricum* L.) during storage. Diponegoro University, Semarang. Semarang.
- [8] Winarno FG. 2010. Food Enzymes. Jakarta (ID): Gramedia Pustaka Utama.
- [9] Fardiaz, S. 1993. Analisis Mikrobiologi Pangan. PT. Raja Grafindo Persada, Jakarta.
- [10] Melda Afriyanti, Bambang Dwiloka and Bhakti Etza Setiani. 2013. Total bacteria, pH, and moisture content of broiler chicken meat after soaking with leaf extract of sesaat (*Melastoma malabathricum* L.) during storage. Faculty of Agriculture and Animal Husbandry, University of Diponegoro, Semarang.
- [11] Suliantri, B.S.L. Jenie., M.T. Suhartonono, dan A. Apriyanto. 2008. Aktivitas antibakteri ekstrak sirih hijau (*piper betle* L) terhadap bakteri patogen. Jurnal dan teknologi Industri Pangan. 19 (1): 1-7.