iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** VI **Month of publication:** June 2019

DOI: http://doi.org/10.22214/ijraset.2019.6337

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue VI, June 2019- Available at www.ijraset.com

Determination of Saponin Value and Phytochemical Properties of Corn Silk (Stigma Maydis) Extract Produced using Microwave Assisted Extraction

Eufronia M. Magundayao
College of Engineering, Architecture and Fine Arts, Batangas State University, Batangas City Philippines 4200

Abstract: ***This study focused on the determination of saponin value and phytochemical properties of corn silk(stima maydis) extract produced using microwave assisted extraction. Different microwave power outputs were used to determine which will produce a higher yield. This power output was then used for the final extraction of the corn silk extract to be used for the laboratory testing. Moreover, the presence of alkaloids, flavonoids, tannins, saponins and glycosides were also determined. Based from the findings, the most efficient microwave power output is 280 watts, but the suitable soaking and extraction time should be considered to maximize the yield. The saponification value and the presence of phytochemical properties of the corn silk (stigma maydis) extract is an indication that stigma maydis can be used as an alternative constituent in the formulation of some products that require high saponification value as well as protective or disease preventive properties.***
Keywords: corn silk(stigma maydis) extract, microwave assisted extraction, microwave power output, phytochemicals, saponin value

I. INTRODUCTION

Maize, generally recognized as corn (Zea mays) belongs to the grass family and is considered as a staple food crop that is grown in many parts of the world. The stem of Maize plant consists of nodes and internode. It has also a 'tassel' and an 'ear' that are located separately on the plant. [1].The crop system can be classified into two stages, the vegetative and reproductive stages. Depending on the condition, it takes 4 to 5 days for a seedling to come out and up to to a maximum of 3 weeks [2].

Corn silk(*Stigma maydis)* comes from a maize female flower that looks like a yellowish thread-like hair strands. The silk starts to increase its length initially from the ovules about 10 to 14 days prior to its growth. The elongation starts from the basal ovules of the cob and the complete appearance of the silk from the ear occurs when the first silks emerge from the leaves of the husk. The corn silks can grow longer up to 1.5 inches per day, although the increase in length will gradually slow down for the succeeding days when the cell reached its utmost size. However, it stops shortly when the pollen is confined, developed and later penetrates the silk. On the other hand, if it does not undergo pollination, the lengthening of the silk will stop after the silk comes out mostly 10 days. [3].

Corn silk(*Stigma maydis)* has been known since ancient times having characteristics of a long styles and stigmas on its flower pistils. The stigmas are well and soft, but the color varies depending on its varieties either yellowish to green or purple in color threads for female flowers. It is considered as a waste product in corn cultivation and harvesting. However, during the ancient period, corn silk is used as an alternative natural-based therapeutic treatment in different illnesses, and thus, possessed some healing properties in different health problems. If properly utilized, corn silk can give great benefits considering its components like nutrients and antioxidant properties [4].

A suitable extraction process can be employed to maximize the benefit that people can get out of corn silk (*Stigma maydis)* The microwave-assisted extraction (MAE) that uses microwave energy to separate the analytes from the sample medium using an appropriate solvent can be used. It uses a closed vessel that can withstand extreme temperature that speeds up the mass transfer occurring in the target compounds [5][6]. Considering its economic aspect, MAE is proven to be effective in obtaining high yield of extract as compared to other usual extraction techniques as well as the reduced time in engaging to the process and lessened solvent consumption [7] [8].

This study therefore will use the microwave assisted extraction to produce corn silk extract to further analyse its saponification value and phytochemical properties. Knowing the presence of these properties will enable researchers to use the corn silk (*Stigma maydis)* extract where it can be applicable and therefore will lessen the waste generated from planting Zea mays.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue VI, June 2019- Available at www.ijraset.com

II. OBJECTIVES OF THE STUDY

This study aimed to employ microwave assisted extraction for the production of corn silk (*stigma maydis*) extract. Specifically, it sought to

A. Determine the yield of corn silk (*stigma maydis*) extract using microwave-assisted extraction.
B. Investigate the saponification value of corn silk extract obtained using microwave assisted extraction.
C. Determine the phytochemical properties of the corn silk (*stigma maydis*) extract in terms of

1) Alkaloids
2) Flavonoids
3) Tannins
4) Saponins
5) Glycosides

III. MATERIALS AND METHODS

This study is an experimental research that used corn silk (*stigma maydis).* Different microwave power outputs(W) were used for microwave assisted extraction to determine the most appropriate parameter to be used for the extraction of corn silk (*stigma maydis*) extract. Moreover, the saponification value of corn silk (*stigma maydis*) extract obtained as well as checking if alkaloids, flavonoids, tannins, saponins and glycosides are present were also determined.

A. Preliminary Preparations

Corn silk (*stigma maydis)* were acquired from Lipa City Public Market. These are then air dried at room temperature and cut to the desired size feasible to carry out the extraction process with ethanol as the solvent. (corn silk: solvent, 1:20, w/ v). After one hour, preliminary extraction process was done to determine what microwave power is suitable to obtain high yield of the extract. The sample and the solvent were subjected to microwave assisted extraction using different microwave power of 210W, 280W, 350W, 420W and 490W for 3 minutes. When the extraction was done, each sample was allowed to cool down to a temperature reasonable to handle. The extracts were filtered, and further purified using rotary vacuum evaporator.

B. Extraction Process.

After determining the best microwave power output to obtain a high yield of the extract, 400 g of corn silk and 8000mL of ethanol was used following the same procedure as in the preliminary preparations but this time, the best microwave power output as confirmed in the preliminary preparations was used. The collected extracts were stored in an air-tight bottle for further screening and testing.

C. Determination of Saponification Value

The saponification value of the corn silk (*stigma maydis)* extract with the highest yield obtained using microwave assisted extraction was investigated. Three replicates were used. Saponification was done by adding 0.5mol/L of potassium hydroxide ethanol, followed by titration with 0.5mol/L hydrochloric acid until the endpoint is reached. The highest inflexion point on titration curve is an indication that the end point is already achieved [9].

D. Phytochemical Screening of Corn Silk (stigma maydis) Extract

The corn silk extract obtained was subjected to phytochemical screening to find out if the extract contains alkaloids, flavonoids, tannins, saponins, and glycosides. The procedures used for phytochemical screening of corn silk (*stigma maydis*) extract were taken from Guevarra [10].

1) *Test for Alkaloids:* The presence of alkaloids was determined by employing Dragendorff's test. This was done by diluting the corn silk *(stigma maydis*) extract with 0.5 mL of distilled water and adding three drops of Dragendorff's reagent. Alkaloids are considered present if an orange precipitate is formed.
2) Test for Flavonoids: In 10% $FeCl_3$, one ml of corn silk (stigma maydis) extract was added and further shaken. The presence of flavonoids was established if a brownish precipitate becomes visible.
3) *Test for Tannins:* In one ml of corn silk *(stigma maydis*) extract, three drops of 1% $FeCl_3$ was added. If a blue-black color appears, it means that hydrolysable tannins is present but if brownish green color appears, it indicates the presence of condensed tannins.

4) *Test for Saponins:* To test if saponins are present, the Froth test was used. In this process, the corn silk *(stigma maydis*) extract was mixed with water and if honeycomb froth was formed or a soap-like foaming appeared after thorough shaking, then, saponins are present.
5) *Test for Glycosides:* If a brown ring at the interface is formed when one hundred mg corn silk *(stigma maydis*) extract is dissolved in one ml glacial acetic acid with 1 drop of 3% FeCl3 that is under layered with 1 ml concentrated sulfuric acid, then it is an indication that there is presence of de-oxy sugar characteristic of cardenolides.

IV. RESULTS AND DICUSSION

A. *Yield of Corn Silk (stigma maydis). Extract Produced Using Microwave-Assisted Extraction*

Table 1 shows the amount of corn silk *(stigma maydis*) extract produced using different microwave power output (210W, 280W, 350W, 420W and 490W) for microwave-assisted extraction. It can be seen that the highest yield of corn silk extract produced is 27 mL using microwave power output of 280 watts. The corn silk extract obtained varies as the microwave power output increases which can be due to the time used during the extraction process. Longer time means greater interaction between the solvent and sample that can cause solvent absorption that can weaken the cell wall. This can lead to a less efficient process. Therefore, a suitable extraction time must be used [11].

TABLE 1
Yield of Corn Silk Extract

Microwave Power Output (W)	Corn Silk Extract Obtained (mL)
210	20.5
280	27
350	16
420	17.3
490	21

B. *Saponification Value of the Corn Silk (stigma maydis) Extract*

The average saponification value of corn silk extract is 18.63 mg KOH/g sample. This value is comparable to the result of the study by Abarquez, et al [12] that used passion fruit seed oil in the production of liquid hand soap. The saponification value for corn silk *(stigma maydis)* extract infers that the fatty acids can be neutralized due to the complete hydrolysis of 1g of fat

C. *Phytochemical Properties of Corn Silk (stigma maydis) Extract*

The phytochemical properties of extracted corn silk extract were analyzed based on its alkaloids, flavonoids, tannins, saponins, and glycosides content. Table 4 shows the result of the analysis.

TABLE 4
Phytochemical Properties of Corn Silk Extract

Properties	Result
Alkaloids	+
Flavonoids	+
Tannins	+
Saponins	+
Glycosides	+

(+) - Present
(-) – Absent

V. CONCLUSIONS

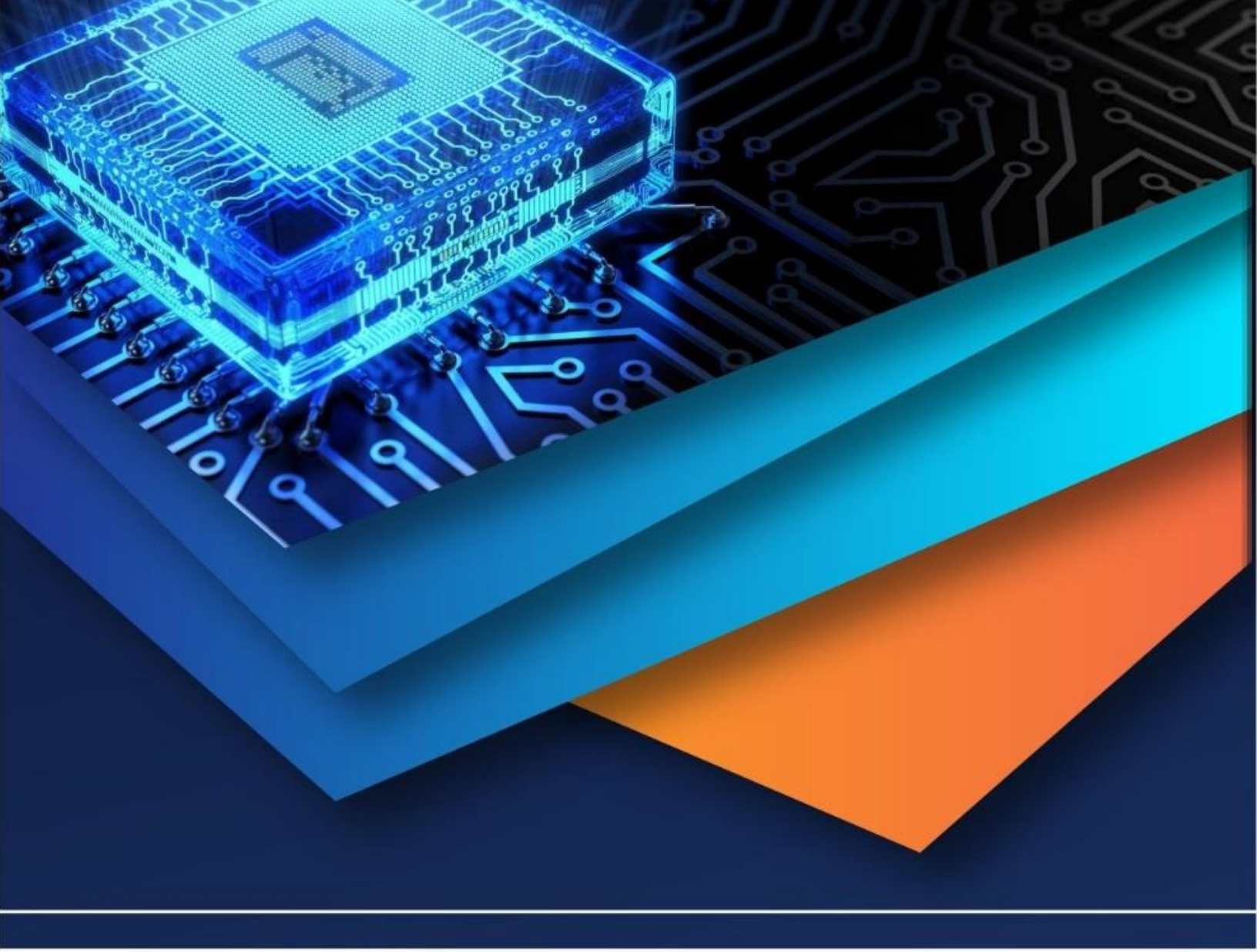
The most efficient microwave power output based on the result of this study is 280 watts, but the suitable soaking and extraction time should be considered to maximize the yield. The saponification value and the presence of phytochemical properties of the corn silk (*stigma maydis)* is an indication that *stigma maydis* can be used as an alternative constituent in the formulation of some products that require high saponification value as well as protective or disease preventive properties.

VI. ACKNOWLEDGMENT

The author would like to express her sincere gratitude and appreciation to the Chemical and Food Engineering Department of Batangas State University and Lipa Quality Control Center, Inc. for the assistance provided during the preparation, analysis and testing of the samples.

REFERENCES

[1] R. Leblanc. (2018). "An Introduction to Solid Waste Management" [Online]. Available: https://www.thebalancesmb.com/an-introduction-to-solid-waste-management-2878102
[2] "Corn Growth & Development" [Online]. Available:https://www.agronomy.k-state.edu/extension/crop-production/corn/corn-growth-velopment/index.html
[3] Nielsen, R.L. Bob.(2016). "Silk Development and Emergence in Corn" [Online]. Available : https://www.agry.purdue.edu/ext/corn/news/timeless/Silks.pdf
[4] Hasanudin, K., Hashim, P., & Mustafa, S. (2012). Corn Silk (Stigma Maydis) in Healthcare: A Phytochemical and Pharmacological Review. *Molecules*, 17, 9697–9715. doi:10.3390/molecules17089697
[5] Daiwik (2017) "10 Amazing Benefits Of Corn Silk." [Online] Available: http://www.stylecraze.com/articles/benefits-of-corn-silk/#gref
[6] Eskilsson, C., Bjorklund, E., (2000). "Analytical-scale Microwave-Assisted Extraction". [Online] Available: http://sci-hub.bz/https://doi.org/10.1016/S0021-9673(00)00921-3
[7] Monica Gallo, Rosalia Ferracane, Giulia Graziani, Alberto Ritieni and Vincenzo Fogliano (2010) "Microwave Assisted Extraction of Phenolic Compounds from Four Different Spices molecules " Global Journal f Bio Science and Biology, *Molecules* , *15*, 6365-6374..
[8] Afoakwah A.N., Owusu, J., Adomako, C. & Teye E. (2012) "Microwave Assisted Extraction (MAE) of Antioxidant Constituents in Plant Materials" Global Journal f Bio Science and Biology, VOL.1 (2: 132-140.
[9] " Saponification value of Fat and Oil" KEM Application Note. [Online] Available: file:///C:/Users/user/Desktop/RESEARCH/ADVISEE/CORN%20SILK/Saponification%20Value-%20Procedure.pdf
[10] Guevara, B. (2005). "A Guidebook to Plant Screening: Phytochemical and Biological" [Online] Available: http://www.nast.ph/images/pdf%20files/Publications/Outstanding-Awardees%20BOOKS/2006/A%20Guidebook%20to%20Plant%20Screening-%20Phytochemical%20and%20Biological.pdf
[11] Jin-Liang Liu , Long-Yun Li , and Guang-Hua He (2016). "Optimization of Microwave-Assisted Extraction Conditions for Five Major Bioactive Compounds from Flos Sophorae Immaturus (Cultivars of Sophora japonica L.) Using Response Surface Methodology" [Online] Available: file:///C:/Users/user/Downloads/molecules-21-00296.pdf
[12] Abarquez, A., Arena, CJ, and Naling, KH. (2017). " Production of Liquid Hand Soap from Passion Fruit(*Passiflora Edulis flavicarpa*) Seed Oil" (Undergraduate Thesis), Batangas State University,
[13] Solihah, M., Rosli, W., Nurhanan, A., (2012). "Phytochemicals Screening and Total Phenolic Content of Malaysian Zea mays Hair Extracts" [Online] Available: http://agris.upm.edu.my:8080/dspace/handle/0/11809
[14] Bhaigyabati, T., Kirithika, T., Ramya, J.,and Usha, K. (2011). " Phytochemical Constituents and Antioxidant Activity of Various Extracts of Corn Silk (Zea mays. L)". [Online] Available: https://www.rjpbcs.com/pdf/2011_2(4)/[106].pdf



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY