

**THE EFFECT OF ALKALINE TREATMENT AND BLEACHING
AGENT TO THE CHARACTERISTICS OF AGAR EXTRACTED
FROM *Gracilaria verrucosa***

***EFEK PERLAKUAN ALKALI DAN PEMUCATAN TERHADAP
KARAKTERISTIK AGAR TEREKSTRAK DARI *Gracilaria verrucosa****

BACHELOR THESIS

Submitted in partial fulfillment of the requirements for a Food Technology Bachelor's degree
in Faculty of Agricultural Technology

By:
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15.11.0149



**DEPARTMENT OF FOOD TECHNOLOGY
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SOEGIJAPRANATA CATHOLIC UNIVERSITY
SEMARANG**

2019

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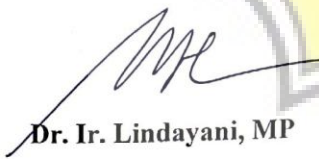
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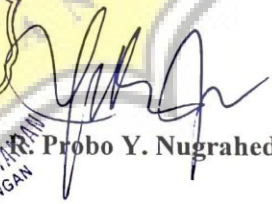
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15.I



SUMMARY

Seaweeds are classified according to their pigmentations into brown, red, and blue. Agar is the main constituent of the cell walls from red algae and mostly extracted from macroalgae orders *Gracilaria* and *Gelidium*. Agar has many application in food processing, pharmaceuticals, cosmetics, microbiology, molecular biology, and also biotechnology. Seaweed is also important for the environment because their ability to supply oxygen to the sea that is important for primary producers in the marine food chain. Some factors affecting the agar are the harvest season, harvesting age, and extraction process. Seaweeds from genus *Gracilaria* are increasingly employed in food industry to substitute the lack of *Gelidium*. There are some differences in the treatment of the seaweed prior to extraction depending on the genus used. Seaweed from genus *Gracilaria* must be treated with alkaline before extraction to increase the gel characteristic. The purpose of this research is to find the best agar powder that extracted at 95°C for 2 hours with different concentration of NaOH and CaCO₃ compared to the commercial in the market. There are five different concentration of alkaline and bleaching agent used which are 2, 4, 6, 8, and 10%. The purpose of NaOH usage is to relax the spectrum of agar and increase the rheological properties of agar. NaOH can also reduce the sulfate content from agar. The sample then soaked in CaCO₃ to bleach the color. To accomodate the purpose of this research, two analysis are needed. There are physical and chemical analysis. Physical analysis including texture, color, and rendement while chemical analysis including pH and water content. The result of this research shows that the addition of NaOH and CaCO₃ have significant effect to the characteristic of agar. The higher addition of NaOH will increase the texture, pH level, and rendement of agar. The texture is increasing along with the addition of NaOH because NaOH can remove the excess sulfate inside the agar that inhibit the bending process of agar. The pH level of agar is increasing due to the addition of NaOH and CaCO₃ because both of them are base compound. The rendement of agar is increasing because NaOH can break the cell walls that makes the agar flows out easily while being extracted. Agar with 10% addition of NaOH and 8% of CaCO₃ has the optimum result of texture analysis (gel hardness), rendement, color compared to the commercial agar.

RINGKASAN

Rumput laut dikelompokkan berdasarkan pigmentasinya menjadi cokelat, merah, dan biru. Agar merupakan unsur pokok dari alga merah yang umumnya diekstrak dari jenis *Gracilaria* dan *Gelidium*. Agar memiliki banyak manfaat di bidang pemrosesan makanan, farmasi, kosmetik, mikrobiologi, biologi molekuler, dan juga bioteknologi. Rumput laut juga memiliki manfaat untuk lingkungan dengan menghasilkan oksigen di dalam laut yang dapat digunakan oleh produsen primer rantai makanan. Terdapat beberapa faktor yang mempengaruhi kualitas agar yaitu musim pemanenan, usia pemanenan, dan proses ekstraksi. Rumput laut yang berasal dari jenis *Gracilaria* semakin banyak digunakan dalam industri makanan untuk menggantikan kurangnya ketersediaan *Gelidium*. Ada beberapa perlakuan berbeda yang dilakukan dalam proses ekstraksi bergantung pada jenis rumput laut yang digunakan. Rumput laut jenis *Gracilaria* harus mendapat perlakuan alkali sebelum proses ekstraksi untuk meningkatkan karakteristik dari gel yang dihasilkan. Tujuan dari penelitian ini adalah untuk mendapatkan kualitas serbuk agar terbaik yang diekstrak selama dua jam pada suhu 95°C dengan beragam konsentrasi NaOH dan CaCO_3 dibandingkan dengan agar komersial. Terdapat lima konsentrasi yang berbeda yaitu 2, 4, 6, 8, dan 10%. Tujuan penggunaan NaOH adalah untuk meningkatkan kemampuan reologi dari agar. NaOH juga mampu mengurangi kandungan sulfat dalam agar. Sampel kemudian direndam dalam larutan CaCO_3 untuk memucatkan warna dari agar. Untuk menjawab tujuan tersebut maka dilakukan dua jenis analisis yaitu analisis fisik dan kimia. Analisis fisik meliputi tekstur, warna, dan rendemen sedangkan analisis kimia meliputi pH dan kadar air. Hasil dari penelitian menunjukkan bahwa terdapat hasil yang signifikan dengan adanya penambahan NaOH dan CaCO_3 . Dengan semakin banyak penambahan NaOH maka nilai tekstur, pH, dan juga rendemen juga mengalami peningkatan. Tekstur mengalami peningkatan dengan adanya penambahan NaOH karena kemampuan NaOH untuk membuang sisa kandungan sulfat yang mampu menghambat pembentukan agar. Nilai pH mengalami peningkatan dengan adanya NaOH dan kalsium karbonat karena keduanya yang bersifat basa. Nilai rendemen juga mengalami peningkatan signifikan karena NaOH mampu merusak dinding sel yang mempermudah agar untuk keluar saat diekstraksi. Agar dengan penambahan 10% NaOH dan 8% CaCO_3 memiliki karakteristik kekuatan gel, rendemen, dan warna yang optimal dan mendekati kontrol komersial.

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The author realizes that there were unintended errors in writing this report. The author really allows all readers to give suggestions to improve the content. However, the author hopes this report can be an inspiration and provide useful information to others

Semarang, October 2019

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