

ABSTRAK

Dunaliella salina merupakan mikroalga halofilik uniseluler hijau yang tumbuh pada salinitas ekstrem salah satunya kolam produksi garam metode tunnel. Pertumbuhan sel *Dunaliella salina* dan kandungan beta karotennya sangat bergantung pada variasi salinitas media. Penelitian ini bertujuan untuk menganalisis nilai kelimpahan sel dan kandungan beta-karoten *Dunaliella salina* pada berbagai salinitas berbeda pada kolam produksi garam metode tunnel dan kultur skala laboratorium. Terdapat lima kolam produksi garam metode tunnel meliputi kolam air baku, kolam bozem, kolam peminihan, kolam kristalisasi, dan limbah bittern. Sedangkan pada kultur skala laboratorium terdapat variasi salinitas yang digunakan, yaitu 15 ppt, 30 ppt, 45 ppt, dan 60 ppt. Hasil kultur *Dunaliella salina* dikeringkan menggunakan metode *freeze drying* pada suhu beku -50°C dan diuji menggunakan spektrofotometri untuk mengetahui kandungan beta-karoten mikroalga ini pada setiap salinitas. Penelitian ini dirancang dengan model eksperimental dan rancangan acak lengkap faktorial. Hasil penelitian menunjukkan pada kolam produksi garam didapat nilai kelimpahan tertinggi pada kolam air baku sebesar 27.333 sel/L dan tidak didapat kelimpahan sel (0 sel/L) pada kolam kristalisasi dan limbah bittern. Sedangkan pada kultur skala laboratorium kepadatan sel *Dunaliella salina* tertinggi didapati pada salinitas 15 ppt sebesar 677.708 ± 53.668 sel/mL, sedangkan kepadatan sel terendah pada salinitas 60 ppt sebesar 445.833 ± 22.960 sel/mL. Variasi salinitas secara signifikan dapat mempengaruhi kandungan beta-karoten *Dunaliella salina*. Perlakuan salinitas tertinggi (60 ppt) mampu menghasilkan rata-rata kandungan beta-karoten sebesar $1,320 \pm 0,01$ $\mu\text{g/g}$. Sedangkan perlakuan salinitas terendah (15 ppt) menghasilkan rata-rata kandungan beta karoten sebesar $0,074 \pm 0,01$ $\mu\text{g/g}$. Secara keseluruhan hasil penelitian menunjukkan bahwa rentang salinitas yang berbeda dapat mempengaruhi karakteristik morfologi, warna, kelimpahan dan kandungan beta-karoten *Dunaliella salina*.

Kata Kunci: *Dunaliella salina*, Beta Karoten, Variasi salinitas, Mikroalga Halofilik

ABSTRACT

Dunaliella salina is a green, unicellular, halophilic microalga that grows under extreme salinity conditions, including in tunnel-method salt production ponds. The growth of *Dunaliella salina* cells and their beta-carotene content are highly dependent on variations in medium salinity. This study aims to analyze the cell abundance and beta-carotene content of *Dunaliella salina* at various salinity levels in tunnel-method salt production ponds and laboratory-scale cultures. There are five salt production ponds in the tunnel method, including the raw water pond, the bozem pond, the seedling pond, the crystallization pond, and the bittern waste pond. Meanwhile, in the laboratory-scale culture, the following salinity levels were used: 15 ppt, 30 ppt, 45 ppt, and 60 ppt. The *Dunaliella salina* cultures were dried using freeze-drying at a freezing temperature of -50°C and analyzed using spectrophotometry to determine the beta-carotene content of these microalgae at each salinity level. This study was designed using an experimental model and a completely randomized factorial design. The results of the study showed that in the salt production ponds, the highest cell abundance was found in the raw water pond at 27,333 cells/L, while no cell abundance (0 cells/L) was detected in the crystallization pond or the bittern waste pond. Meanwhile, in laboratory-scale cultures, the highest *Dunaliella salina* cell density was found at a salinity of 15 ppt, at $677,708 \pm 53,668$ cells/mL, while the lowest cell density was found at a salinity of 60 ppt, at $445,833 \pm 22,960$ cells/mL. Variations in salinity can significantly affect the beta-carotene content of *Dunaliella salina*. The highest salinity treatment (60 ppt) produced an average beta-carotene content of 1.320 ± 0.01 µg/g. Meanwhile, the lowest salinity treatment (15 ppt) produced an average beta-carotene content of 0.074 ± 0.01 µg/g. Overall, the results of this study indicate that different salinity ranges can affect the morphological characteristics, color, abundance, and beta-carotene content of *Dunaliella salina*.

Keywords: *Dunaliella salina*, beta-carotene, salinity variation, halophilic microalgae