

Abstract

Oktaviona, 24020222140054, **The Effect of Temperature Stress Based on Incubation Time Variation on Carotenoid Production by *Chlorella sorokiniana* M22 Microalgae.** Under the guidance of Siti Nur Jannah and Khairul Anam

Chlorella sorokiniana is a green microalga belonging to the division Chlorophyta. This microalga produces specific compounds, including carotenoid pigments. Carotenoid pigment production is influenced by various factors, one of which is temperature. Elevated temperatures have been reported to enhance carotenoid pigment production. Therefore, this study aimed to increase carotenoid production by applying heat stress at 40°C based on varying incubation durations (30 seconds, 60 seconds, 120 seconds, 300 seconds, and a no-stress treatment as the control), to assess the cell viability of *C. sorokiniana* M22, and to detect the presence of Reactive Oxygen Species (ROS) following heat stress exposure at 40°C. This study employed a Completely Randomized Design (CRD) with heat stress at 40°C applied across specific incubation time variations, with three replications. The incubation duration treatments for heat exposure at 40°C consisted of 30 seconds, 60 seconds, 120 seconds, 300 seconds, and an untreated group as the control. The experimental workflow comprised purification of *C. sorokiniana* M22, growth curve construction, cultivation, application of heat stress at 40°C at specified incubation durations, enumeration of cell and colony counts, determination of carotenoid content, and ROS detection. The results demonstrated that heat exposure at 40°C across varying incubation durations significantly enhanced carotenoid pigment production in *C. sorokiniana* M22, with notable increases observed at exposure durations of 60 seconds (0.6043 µg/mL) and 120 seconds (0.2991 µg/mL) compared to the control (0.2991 µg/mL).

Keywords: Carotenoids, *Chlorella sorokiniana*, ROS, and Temperature stress.