ABSTRACT OF THE DISCLOSURE

A method of culturing a microorganism capable of producing at least any one of a highly unsaturated fatty acid or a compound containing a highly unsaturated fatty acid as a constituent fatty acid in a culture medium containing at least a carbon source and a nitrogen source, using an aeration-agitation culture device capable of adjusting and controlling an agitation power and an aeration amount. The method comprises the steps of performing mechanical agitation for a predetermined time after start of culture, where the agitation power per unit liquid amount is 269 (W/m^3) or less, and after the predetermined time has passed, adjusting and controlling at least any one of the maximum aeration amount and a maximum power required for agitation to a range which satisfies that KLA ($=(P/V)^{0.95}Vs^{0.67}$) is 59 or more, an air flow rate parameter $Vs^{0.67}$ is 0.075 or more, and a required agitation power parameter $(P/V)^{0.95}$ is 203 or more, where P represents power required for agitation (W), V represents a liquid amount (m^3), and Vs represents an air flow rate (m/sec).