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Interaction effects of salinity, alkalinity, hardness and temperature on growth of *Gracilaria fisheri* were determined. Two set of experiments were conducted under laboratory conditions. In Experiment I, algal samples were grown under 4 ranges of alkalinities: 71-90, 111-130, 151-170 and 191-210 mg $CaCO_3$/l at different salinities of 15, 25, 35, 45 ‰ and temperatures of 25, 34, and 38 °C. In Experiment II, algal samples were grown under 4 ranges of hardness: 3001-4000, 5001-6000, 7001-8000 and 9001-10000 mg $CaCO_3$/l at different salinities of 15, 25, 35, 45 ‰ and at temperatures of 25, 34, and 38 °C. Fresh algal materials were soaked in 10 ppm of PES media for 2 hrs prior to culture experiments. Forty milligrams of initial fresh weight of each algal sample were grown in sterilized seawater in 300 ml glass bottle under controlled light intensity of 100 μ E m^{-2} s^{-1}. Algal growth was determined every 7-10 days interval as percentage of fresh weight per day. Each experiment was conducted for 8 weeks. In this study, *G. fisheri* could grow at alkalinity range from 71-210 mg $CaCO_3$/l and hardness of 3001-10000 mg $CaCO_3$/l at salinity of 15-45 ‰ and temperature of 25-34 °C. However, optimum range of alkalinity and hardness for growth of *G. fisheri* was from 71-130 mg $CaCO_3$/l and 4001-8000 mg $CaCO_3$/l, respectively when salinity ranged from 25-35 ‰ at temperature of 25 °C. Under these culture conditions, thalli were healthy, succulent and had much long branching. Algal growth was gradually decreased when grown at alkalinity of 151 mg $CaCO_3$/l in all salinities and temperatures when there appeared white crystal of limestone precipitated on thalli surface. Thalli were rigid, brittle and easily broken. Increasing effects of alkalinity on *Gracilaria* growth were observed when salinity and temperature reached 45 ‰ and 34 °C, respectively. Thalli were markedly declined in all experiments when temperature exceeded 38 °C.

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