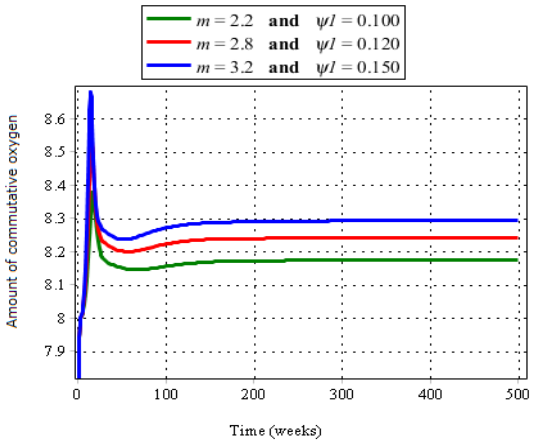

(d)

Fig.3 Growth rates of carbon dioxide, phytoplankton, zooplankton, and dissolved oxygen for the different values of m and ψ_1.

V. Conclusion

This study is an environmental modeling work that describes the impacts of CO_2 on marine plankton. A nonlinear mathematical model has been newly formulated. The study has been analyzed both analytically and numerically. The work aims to illustrate the potential impacts of carbon dioxide on the growth of marine plankton through mathematical modeling. We have performed the stability analysis at each obtained equilibrium point where one equilibrium point is stable and the other three are stable under some conditions. After investigating the simulations, we obtained that the density of phytoplankton proportionally increases with the increase in carbon dioxide. The study also showed that the production of oxygen and the absorption of carbon dioxide depend on the density of marine phytoplankton. The study represents the natural interactions among environmental factors. Therefore, it combines environmental dynamics with Applied Mathematics.

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Authors Contribution

Sajib Mandal carried out the model formulation, simulation, and overall arranging of the manuscript.
M. S. Islam has performed analytical analysis.
M. H. A Biswas has implemented the Algorithm and simulation.