Paralytic shellfish poisoning (PSP) is a fatal human syndrome spread worldwide caused by ingestion of shellfish containing paralytic shellfish toxins (PSTs), originating mainly from accumulation in bivalve molluscs of PSTs produced by dinoflagellates from the genus *Alexandrium* sp., and *Gymnodinium catenatum* in temperate waters. The present study was undertaken to verify effects of iron concentration on PST amount and composition of *Alexandrium tamarense* CCUMP 1493, and toxin accumulation in shellfish, *Mytilus edulis* fed on toxic *A. tamarense*. *A. tamarense* was maintained in Aquil artificial seawater medium at 22°C with 220 μmol photons m⁻² s⁻¹ light intensity provided by a 16 h:8 h light/dark photoperiod. *A. tamarense* with 8.0 x 10³ cells/mL were fed to *M. edulis* 3 times per day for 3 days. Toxin extracts from *A. tamarense* and *M. edulis* were analyzed by post column derivatization HPLC system. The higher concentration of iron, the faster growth rate of *A. tamarense*, and the growth rate of *A. tamarense* was fastest at 100 nmol/L of iron concentration. The higher concentration of iron, the more toxin amount of *A. tamarense* at range of 10-1,000 nmol/L, but the toxin amount of *A. tamarense* was most at 1 nmol/L of iron concentration and the amount of gonyautoxin (GTX) 1 and 4 were much more than those at other iron concentration. The toxin amount of *M. edulis* was more than that of *A. tamarense* and amount of GTX 1 and neoSaxitoxin were increased in *M. edulis* when *A. tamarense* were fed to *M. edulis*. 