The increase in world population leads to the growth in energy demand. The primary sources of this energy come from the combustion of fossil fuel which produces oxides of nitrogen and other harmful greenhouse gas emissions. However, biodiesel offers a solution as an alternative fuel for internal combustion engines but higher in NOx emission. Exhaust gas recirculation (EGR) system is used to lower the NOx emission. This paper focuses on determining the effect of EGR and palm biodiesel on fuel consumption (SFC), exhaust gas temperature (EGT) and exhaust emissions (NOx, CO, UHC, and CO2). Experimental works using a multi-cylinder diesel engine with EGR and simulated works using Diesel-RK were performed at a constant engine speed of 2500 rpm in full load condition. The results showed that, from the simulated and experimental works, palm biodiesel significantly increased fuel consumption, increased NOx and slightly decreases in other emissions including CO2, CO, and unburned hydrocarbon (UHC). However, the use of EGR shows a significant reduction in the NOx emission and exhaust temperature but increases in fuel economy, CO, CO2, and UHC emissions.