



## A Study on degradation kinetics of thiamine in red gram dhal (*Cajanus cajan L.*)

### ABSTRACT

Knowledge of degradation kinetics including reaction order, rate constant and activation energy is essential to predict quality loss during storage as well as thermal processing. Thiamin is one of the least stable vitamins. The kinetics of thiamin degradation in red gram dhal (*Cajanus cajan L.*) as well as in pure thiamin solutions at initial concentration (0.38 mg/100 g) present in red gram dhal at pH 4.5, 5.5 and 6.5 over a temperature range of 50-120°C (steady state temperature process) was studied. The degradation kinetics of thiamine in normal open pan cooking, pressure-cooking and a newly developed and patented fuel-efficient 'eco – cooker' was also studied (unsteady state heating process). The thiamine degradation followed first order reaction kinetics where the rate constant increased with an increase in temperature. The temperature dependence of degradation was adequately modeled by Arrhenius equation. Activation energies increase from pH 4.5 to 6.5 indicating greater heat sensitivity at higher pH. A mathematical model was developed using the steady state kinetic parameters obtained to predict the losses of thiamin from the time-temperature data of the unsteady state heating processing method. The results obtained indicate a greater degradation of thiamin in pressure-cooking followed by 'eco cooker' and open pan cooking.