Purification and biochemical characterization of a β-cyanoalanine synthase expressed in germinating seeds of *Sorghum bicolor* (L.) *Monech*

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**Objective:** The objective of this study is to purify β-cyanoalanine synthase from germinating seeds of sorghum to electrophoretic homogeneity and then determine its biochemical and catalytic properties.

**Methodology:** β-cyanoalanine synthase was isolated from sorghum seeds, purified using chromatographic techniques and its biochemical and catalytic properties determined.

**Result:** The purified enzyme had a yield of 61.74% and specific activity of 577.50 nmol H₂S/min/mg of protein. The apparent and subunit molecular weight were 58.26±2.41 kDa and 63.4 kDa. The kinetic parameters with sodium cyanide as substrate were 0.67±0.08 mM, 17.60±0.50 nmol H₂S/ml/min, 2.97x10⁻¹ s⁻¹ and 4.43x10⁻¹ M⁻¹s⁻¹ for KM, Vmax, kcat and kcat/KM respectively. With L-cysteine as substrate, the kinetic parameters are 2.64±0.37 mM, 63.41±4.04 nmol H₂S/ml/min, 10.71x10⁻¹ s⁻¹ and 4.06x10² M⁻¹s⁻¹. The optimum temperature and pH for activity were 35°C and pH 8.5 respectively. The activation energy obtained was 131.75 J/mol/K. The enzyme retained more than half of its activity at 40°C. Both monovalent and divalent ions enhanced enzyme activity. Inhibitors such as HgCl₂, EDTA, glycine and iodoacetamide reduced enzyme activity.

**Conclusion:** The biochemical properties of the purified β-cyanoalanine synthase in germinating sorghum seeds highlight its roles in maintaining cyanide homeostasis.