

Abstract

Phytase is a phosphatase enzyme which release inorganic phosphorus from phytate compounds available in feed and soil to enhance the uptake of phosphorus in monogastric animals and plants respectively. The present study was carried out on purification, characterization and biotechnological applications of phytase from *Rhizopus stolonifer*. *Rhizopus stolonifer* was utilized for the production of phytase enzyme by surface culture fermentation technique. In order to optimize the fermentation protocol, the effect of various fermentation parameters were evaluated on the production of phytase enzyme such as effect of pH, incubation temperature, incubation period, phytase inducer wastes and their concentrations, carbon and nitrogen sources and their concentrations, concentrations of various micronutrients i.e. $MnSO_4 \cdot 4H_2O$, KH_2PO_4 , KCl, $MgSO_4 \cdot 7H_2O$ and $FeSO_4 \cdot 7H_2O$. Using optimized conditions, maximum production was obtained which was 7.155 ± 0.521 U/ml. Phytase produced from *Rhizopus stolonifer* characterized for best activity. Effect of pH, temperature, thermal stability, pH stability, substrate concentration, different metal ions and inhibitors on phytase activity was observed. Optimum temperature and pH for phytase activity was found 40°C and 6.0 respectively. It was also observed that phytase from *Rhizopus stolonifer* show a wide range of thermal and pH stability. It was observed that Phytase enzyme extracted from *Rhizopus stolonifer* was purified by precipitating the protein using ammonium sulfate followed by dialysis. The purified phytase activity was found 7.82 ± 0.852 U/ml. Phytase was applied as a biofertilizer on maize plant and as a potential bread making additive in food industry. Phytase was applied to enhance the growth of chickens in this study and it was observed that phytase increase the weight and egg production efficiency of chickens as compared to control.