Journal of Applied Biosciences 125: 12518-12530

ISSN 1997-5902

Biochemical characterization of Burkina red radish (*Raphanus sativus)* peroxidase

Mamounata Diao[1]*, Crépin I. Dibala[1], Brice N'cho Ayékoué[2], Mamoudou H. Dicko[1].
[1]Laboratoire de Biochimie Alimentaire, Enzymologie, Biotechnologie Industrielle et Bioinformatique (BAEBIB), UFR-SVT, Université Ouaga I Pr Joseph KI-ZERBO, Burkina Faso. 09 BP 848 Ouagadougou 09 (Burkina Faso).
[2]Laboratoire de biocatalyse et de bioprocédés. Université Nangui Abrogoua, 02 BP 801 Abidjan 02 (Côte d'Ivoire).
*Correspondance: Mamounata DIAO, PhD. Phone: (+226) 78620628 /76531787; Fax: (+226) 50307242; Email: mamounadiao@yahoo.fr

Original submitted in on 14th February 2018. Published online at www.m.elewa.org on 31st May 2018 https://dx.doi.org/10.4314/jab.v125i1.2

ABSTRACT

Objectives: Peroxidases (POX), isoenzymes were purified to homogeneity from bulbs of *Raphanus sativus* (Radish) grown in Burkina Faso and characterized for use as an alternative source of POX for biotechnological applications.

Methodology and Results: The enzymes were purified using cation exchange, anion-exchange and hydrophobic interaction chromatography. Two isoperoxidases, cationic POX1 and anionic POX2, were isolated and purified 18.5 and 27.2 fold, respectively. Purified enzymes were found to be monomeric proteins with molecular masses of 70 kDa and 47 kDa for POX1 and POX2, respectively, as determined by SDS-PAGE. The effect of pH and temperature was done using guaicol as a substrate. The optimal pH of the both purified POX was 5.6 and 80 % of its activity was retained at pH values between 4.0–8.0 after incubation for 2 h, but POX2 appeared to be highly stable than POX1. POX1 and POX2 had optimum temperatures of activity at 35° and 40 °C, respectively. Activities of these isoenzymes were determined using different phenolic substrates in the presence and absence of ionic effectors. The results show that both POX activities were activated by bivalent cations such as Mg^{2+} and Ca^{2+} but were inhibited by K^{+}, Na^{+}, Zn^{2+}, EDTA and reducing compounds. While Ba^{2+} is an activator for POX2, it had no effect on POX1. They oxidize all the phenolic compounds used. The greatest rate was obtained with ABTS and guaiacol, for POX1 and POX2, respectively.

Conclusions and application of findings: POXs oxidize a wide range of phenolic substrates and have high stability at a wide range of pH. These properties make these enzymes potential biotechnological tools. They could be use in industrial applications to produce food dyes, phenolic resins from natural phenolic compounds or in the construction of biosensors and kits for analyses and diagnostics. They could play also an important role in the oxidation of phenolic compounds in polluted water. This is interesting because it could be useful in finding solutions to the thorny problem of recalcitrant phenolic compounds that resist to conventional methods for bioremediation.

Keywords: peroxidase, purification, characterization, *Raphanus sativus,* phenolic compound.