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Utilization of protease activity of *Carica papaya* for the hydrolysis of fish waste

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This study was undertaken to investigate whether fish waste can be used as a source of nitrogen in agricultural purposes to fulfill plant nitrogen requirements. However, fish waste, being a rich source of proteins should be hydrolyzed first to make nitrogen soluble and available to plants. The objective of the present work was to assess the proteolytic activity of *Carica papaya* plant parts which are rich in proteases, papain being the major enzyme, for the hydrolysis of fish waste. Crude enzyme extracts were prepared from different parts of *C. papaya*, i.e. leaves, unripe peel, ripe peel, ripe pulp of the fruits (5 g wet weight/ 20 mL distilled water) and latex (5 g dry weight/ 20 mL distilled water). They were tested qualitatively by milk coagulation test, and quantitatively by universal protease enzyme assay at different temperatures (37^0C, 55^0C, 70^0C and 80^0C) and pH (2.5, 4, 5.5, 7.5 and 9) to determine the optimal conditions for the enzymatic activity. The amount of hydrolyzed proteins in powdered fish waste was determined by the Bradford method over different incubation periods (1, 2, 5, 24 and 48 hours). Milk coagulation test confirmed the presence of proteases. Latex and ripe pulp resulted in the highest enzyme activities respectively1.22±0.19 and 0. 03±0.05 μmol/mL of crude extract at 55^0C, while leaves showed the highest activity of 0.66 ± 0.09 μmol/mL of crude extract at 70^0C, ripe and unripe peel showed the highest activities of 0.19 ± 0.09 and 0.12 ± 0.74 μmol/mL crude extract respectively at 90^0C. The optimal pH for latex and unripe peel was 7.5 and 5.5 for leaves. Five hours' incubation of fish waste with latex and leaves, and 24 hours incubation with ripe peel and pulp resulted in significantly higher amount of hydrolyzed proteins. The highest enzyme activity on fish waste hydrolysis was shown by the papaya latex followed by the leaves, ripe pulp and ripe peel. Different parts of *C. papaya* can be used effectively as a cost effective, potential source for hydrolysis of fish waste protein.

Keywords: *Carica papaya*, Fish waste**,** Papain, Protease