

**EXTRACTION OF PROTEASE FROM STARFRUIT
(*Averrhoa carambola* L.)**

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ABSTRACT

EXTRACTION OF PROTEASE FROM STARFRUIT (*Averrhoa caribbola* L.)

Proteases were extracted from starfruit of different maturity index of Index 2 (light green) and Index 7 (orange). The extracted proteases were purified using acetone and 40% ammonium sulphate. The enzyme activity of the obtained proteases were analysed for stability at different pH, temperature and during storage at 4°C. Molecular weight distribution of purified proteases were also determined with SDS-PAGE electrophoresis. Protein content of starfruit is 0.73%. Protein concentration of purified protease with 40% ammonium sulphate was higher compared to the acetone purification. Index 2 protease purified with a 40% ammonium sulphate have high enzyme activity at pH 8 and temperature 60°C while for Index 7 at pH 6 and 60°C. Index 2 protease purified with acetone have high enzyme activity at pH 8 and at 50°C while for Index 7 at pH 6 and 50°C. The enzyme activity of both maturity index of protease purified with acetone and 40% ammonium sulphate decreased with storage time. Starfruit protease had high enzyme activity in the range of 100 to 1100 CDU/mg. The protein band at 50 kDa was found in all the prepared proteases. Protein bands were clear for protease purified with acetone compared to the proteases purified with 40% ammonium sulfate. This study suggested that acetone precipitation is a better method to purify starfruit protease and protease content and activity are higher in starfruit at the unripe stage which is Index 2. Starfruit proteases may be used as a protein hydrolysing agent in several areas in food industries.

CHAPTER 1

INTRODUCTION

1.1 Background Study

Starfruit (*Averrhoa carambola L.*) or locally known as “Belimbing Besi” is one of the tropical fruits grown in Malaysia for many decades. Starfruit is non-seasonal and usually gives 3-5 crops per year. Total planted area in 2011 are 1,318 hectare with estimated production of 12,934 metric tonnes especially in Selangor, Negeri Sembilan and Johor. In 2009, 1,177 hectare of starfruit was grown and increase to 1,318 hectare in 2011 and this trend almost status-quo due to limited market access, high cost of production and uncertain ex-farm price (Ministry of Agriculture, 2011). Malaysia are the largest exporter of starfruit in the world today to Europe market constitute about 90% of the total exporters. The domestic starfruit market is projected to increase by 120% from 27,498 metric tonnes in 2002 to 60,412 metric tonnes in 2010. More than 90% of the annual starfruit production, valued at 20 to 30 million in Malaysian Ringgit Malaysia (MYR), is exported. In 2002, Malaysia ranked 9th in the world with 0.4% market share. Starfruit’s export value grew at the rate of 2.3% between 1992 and 2002. Fresh starfruit exports increased from MYR 23.38 million in 1992 to MYR 30 million in 2002. In 2002, starfruit ranked 3rd in terms of fruit export value (Ministry of Agriculture, 2011).