

## THE RELATIVE BROMELAIN CONTENTS IN DIFFERENT PARTS OF PINEAPPLE PLANT *C.V. QUEEN*

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Pineapple [*Ananas comosus* (L) Merr.] is a good source of a multipurpose protease, bromelain. The enzyme belongs to the class of cysteine proteinase and has considerable applications in industry as well as in medicine. (Taussig *et al*, 1988; Meztler, 1977). The enzyme from stem and fruit of pineapple (*c.v. cayenne*) had been extensively studied. The present study aimed at the determination of bromelain content in different parts of pineapple using the variety queen, a widely grown variety in Manipur. The objective of the study was to find out whether this variety could be an alternative source of the enzyme and its waste such as crown leaf and fruit skin could also be used as good sources of the enzyme.

Fresh plants of pineapple (*c.v. queen*) were collected and different parts *viz.* crown leaf, fruit pulp, fruit skin, stem and true leaf were used for bromelain extraction. Samples of 50g of the parts were taken and chopped into small pieces. These chopped parts were then homogenized separately in 75ml of pre-cooled 20mM sodium citrate-HCl buffer pH 6.0 containing 0.05mM phenylmercuric acetate and 1% polyvinyle pyrrolidone in a kitchen mixer. The resulting homogenate were strained through a coarse cotton cloth and centrifuged for 10 min at 12,000 x g at 4°C. The supernatants were collected through glass wool to yield a clear solution of crude bromelain extracts. The enzyme was assayed following Henrikson and Kezdy (1976) with slight modifications. Assaying was done spectrophotometrically by monitoring the rate of p-nitrophenol formation in a solution of 0.37 mM N $\alpha$ -CBZ L-lysine p-nitrophenyle ester in 0.2M sodium acetate-HCl buffer pH 4.6 containing 0.1 MKCl and 1 mM L-cysteine at 30°C.

One unit of enzyme activity has been defined as the amount of enzyme which releases one micromole of p-nitrophenol from the substrate per minute under the condition of enzyme assay. Protein was determined (Lowry *et al*, 1951) using bovine serum albumin as the standard. The specific activity has expressed in units per milligram protein. A typical relative bromelain contents in the different pineapple parts are given in table 1.

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Table 1. The relative contents of bromelain in different parts of pineapple c.v. queen

| Plant parts | Volume of crude extract (ml) | Activity (Units/ml) | Total activity (units) | Protein (mg/ml) | Total protein (mg) | Specific activity (units/mg) | Activity/wet weight of part (units/g) |
|-------------|------------------------------|---------------------|------------------------|-----------------|--------------------|------------------------------|---------------------------------------|
| Fruit pulp  | 93.0                         | 8.24                | 766.3                  | 0.68            | 63.20              | 12.13                        | 15.33                                 |
| Fruit skin  | 83.0                         | 2.63                | 218.3                  | 0.48            | 39.84              | 5.48                         | 4.37                                  |
| Stem        | 82.0                         | 6.90                | 565.8                  | 1.47            | 120.50             | 4.70                         | 11.32                                 |
| Crown       | 84.0                         | 2.08                | 174.7                  | 0.73            | 61.30              | 2.85                         | 3.49                                  |
| leaf        |                              |                     |                        |                 |                    |                              |                                       |
| True leaf   | 86.0                         | 0.30                | 25.8                   | 0.44            | 37.80              | 0.68                         | 0.52                                  |

The order of the different pineapple plant parts with decreasing total extractable bromelain activity per unit wet weight was found to be fruit pulp, stem, fruit skin, crown leaf and true leaf. The order was fruit pulp, fruit skin, stem, crown leaf and true leaf in case of specific activity. Protein content (mg/ml) was not significantly different in different parts whereas, difference in activity (units/ml), specific activity (units/mg), total activity (units), total protein (mg) and activity per unit wet weight (units/g) in different parts were significant at 5% level of significance. Thus, the fruit pulp and stem will remain as the main source of the enzyme. However, fruit has many other uses and using stem as a source also kills the plant. From the present study it can be concluded that the crown leaf and fruit skin which contain moderate amounts can be used as the alternative sources of this enzyme. Using crown leaf and fruit skin as sources of this enzyme will serve two purposes i.e. to use otherwise wasted materials and to help to check the disposal problem of these parts from industries.

#### REFERENCES

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