

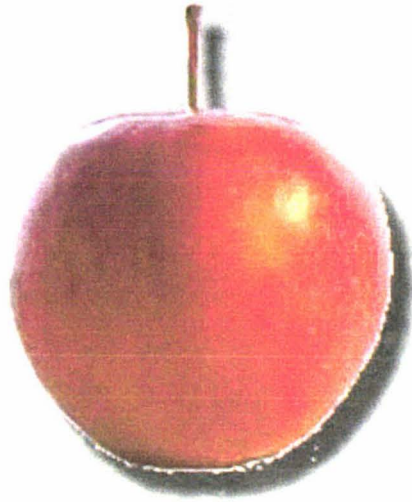
**EVALUATION OF MASSEY TWIST TESTER FOR
TEXTURAL ASSESSMENT OF FRUITS AND
VEGETABLES**

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2000

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**To the Glory of God in Jesus Christ my Lord and
Saviour, to Whom I owe Everything.**



*“One of the great joy known to man is to take a flight into
ignorance in search of knowledge.”*

-Lynd

**EVALUATION OF MASSEY TWIST TESTER FOR
TEXTURAL ASSESSMENT OF FRUITS AND VEGETABLES**

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ABSTRACT

The Massey Twist Tester is an instrument developed to assess the texture of fresh fruit and vegetables rapidly. Since its original development in 1990, the Twist Tester has been modified extensively and numerous prototypes have been developed. In principle a small rectangular flat blade is rotated inside the fruit, and the torque required is measured. The current version incorporates a motor driven unit rotating inside a set of needles which hold the fruit firmly. Although measurements of fruit properties have been reported in previous studies, these have all been based on earlier designs, and no data on the new version of the Twist Tester have yet been published.

The main aim of this study is to evaluate the performance of the new version of the Twist Tester by comparing it to the standard penetrometer, which has been widely used in many parts of the world for several years.

Samples of fruit and vegetables were stored in different conditions to vary the level of firmness in order to expose how well each instrument performed in detecting the changes of textural properties.

Generally, both Twist Tester and Penetrometer readings declined with storage time. In the testing of Braeburn apples, the Twist Tester has highly correlated with storage time as compared to penetrometer,

The Twist Tester and Texture Analyser produced results for the Royal Gala apples which were highly correlated with those obtained from the penetrometer, suggesting that this test could be used, as it is more reliable for determining the maturity of apples. For plums, the correlation of the Twister with storage time at three storage

conditions were high ($r = 0.92, 0.95$ and 0.92), compared to the correlated of penetrometer with storage time which was ($r = 0.83, 0.44$ and 0.77). The penetrometer has a slightly higher degree of correlation with storage time for pears, compared to the Twist Tester. Pears declined in crushing strength and penetrometer readings with storage time, but over the last 7 days the value of firmness increased. The literature review showed that when water loss from the fruit is extreme, it forms a rubbery texture, produces a higher degree of firmness. Further research work would need to be done to obtain a more reliable result.

The Twist Tester performed well in predicting the changes of textural properties of nashi, which showed a stronger correlation with storage time than the penetrometer relationship with storage time. During storage of kiwifruit, the penetrometer could not detect any changes after 14 days, while Twist Tester obtained a reliable result. This showed that penetrometer could not test the firmness of texture of any soft fruits. The relationship between the crushing strength and storage time produced a high coefficient in all three storage conditions ($r = 0.91, 0.89, 0.80$) while the penetrometer readings showed the following correlations with storage time ($r = 0.77, 0.76, 0.44$). Thus the Twist Tester can determine the maturity of kiwifruit as well as any soft tissue products. Changes in the textural properties of potatoes also were well detected by the Twist Tester, which showed a stronger correlation with storage time than did the penetrometer.

Firmness and crispness as measured by both the Twist Tester and penetrometer readings were highly correlated, while other variables showed only a poor relationship with instrumental measurement. Further research is needed to improve these results by using a well-trained taste panel.

Changing the speed of Twist Test has no significant effects on the crushing strength of fruit and vegetables within the range of 5-10 rpm.

The Twist Tester is more accurate, easy to operate and may be used to determine the quality and maturity of a wider range of products than penetrometer.

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