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A Comparative Study of Two Consistometers for the Measurement of Tomato Paste Consistency

Samuel L. Wang[1]
Horticultural Research Institute of Ontario, Vineland Station, Ontario, Canada L0R 2E0

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The measurement of tomato paste consistency has become increasingly important due to food processors' greater need for thicker tomato paste. Although several instruments have been used (1, 2, 4), the Bostwick consistometer (5) has been adopted by many laboratories and is considered to be the most reliable device available. Only the Adams consistometer, which is similar to the Bostwick in principle, has been reported to show a significant correlation (1).

The FMC consistometer (C.W. Brabender Instruments, S. Hackensack, N.J.) registers torque force exerted on a metal paddle submerged in a revolving cup filled with paste. Torque readings register between 0 and 100 units and are dependent on paddle size.

The purpose of the present study was to compare the quantitative response of the FMC consistometer to that of the Bostwick.

Four tomato paste samples of unknown cultivars from different processors were used. Since the consistency of full-strength tomato pastes could not be measured with either instrument, samples were diluted stepwise with water to decreasing levels of NTSS. The tomato solids were fully rehydrated with hot water and then cooled to room temperature prior to analysis, as suggested by Marsh et al. (3), and measured at several concentrations with both instruments. A D-paddle was chosen for the FMC consistometer after preliminary testing with the four standardized paddles supplied by the manufacturer. Regression lines were obtained by plotting the logarithms of the consistency readings against the NTSS on semilogarithmic graphs.

Consistency by the Bostwick method was shown to correlate negatively with the NTSS with a linear regression similar to those found in previous studies (2, 3). The FMC consistency, in contrast, correlated with the NTSS positively. A quadratic regression curve provided the best fitting with high coefficients of determination ($r^2 > 0.97$). However, at readings <65, linear regression lines could be used (Fig. 1).

Readings from the FMC consistometer and those from the Bostwick for the same series of samples were significantly correlated. A quadratic regressoin curve $Y = 0.226x^2 - 8.136x + 75.06$, with an r^2 of 0.95, was established.

Both consistometers were more accurate at NTSS levels below 16°Brix. However, because of the flexibility of choosing different shapes and sizes of paddles, the FMC consistometer is slightly more versatile.

In summary, this study showed that the FMC consistometer like the Bostwick, is a useful tool for analyzing tomato paste consistency.

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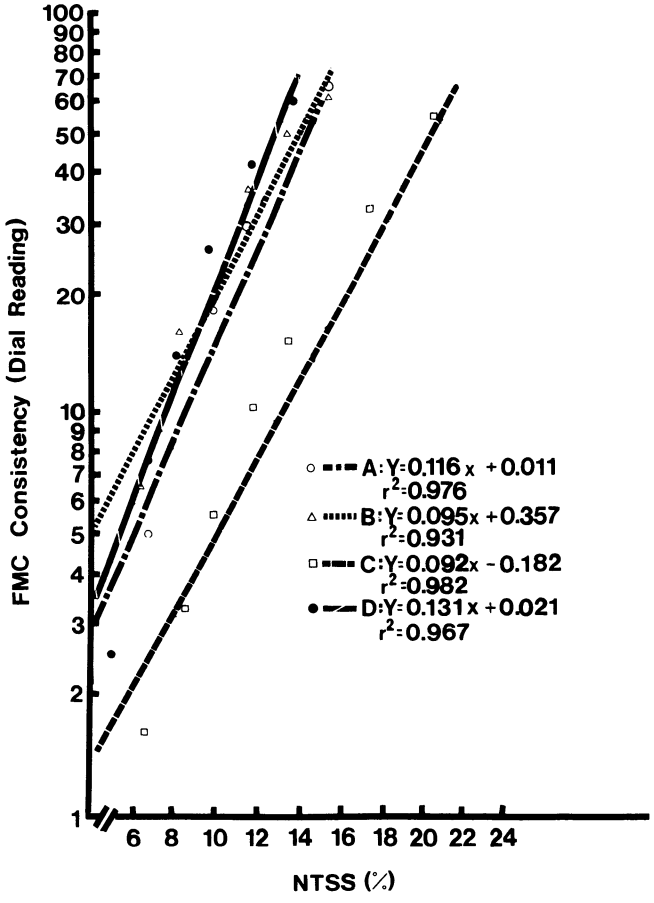

Fig. 1. Regression between the FMC consistency and the NTSS of four tomato paste samples.

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[1]Research Scientist.