

Study on the Sugar Content of Bananas and Simulation Process Ethylene Production Storage Research

Ping-Kun Tsai¹, Ching-Wei Cheng²

¹Department of Bio-industrial Mechatronics Engineering/National Chung Hsing University
No.145 Xingda Rd., South Dist., Taichung City 402, Taiwan (R.O.C.)

tpk8513@gmail.com; cwcheng@nutc.edu.tw

²College of Intelligence/National Taichung University of Science and Technology
No.129, Sec.3, Sanmin Rd., North Dist., Taichung City 404, Taiwan (R.O.C.)

Extended Abstract

Banana is an important economic fruit exported from Taiwan. It is a typical climacteric fruit and must be forced ripening after harvesting. It is not easy to be transported and stored when they are mature. During the process, ventilation and ethylene absorbent are used to slow down the banana maturation rate. In this study, a Kubota K-BA100 near-infrared spectrum analyzer was used to measure the spectral value of bananas. The sugar calibration equation was established to probe into the relationships among sugar content. The effect by the friction of the peel due to vibration caused an increase in ethylene [1-3], therefore a vibration test machine was used to simulate the vibration process of shipping [4], and then find the relationship between the sugar content of bananas, the amount of ethylene produced by bananas in the packaging box [5], and the amount of ethylene absorbent applied to banana ripening. Select six spectral wavelengths (924 nm, 782 nm, 874 nm, 814 nm, 882 nm, 864 nm) and then establish a correction equation. The correlation coefficient of the calibration group samples reached 0.854, and the SEC value was 0.758 °Brix. The correlation coefficient reached 0.777, the SEP value was 1.045 °Brix, and the correlation coefficient for the random group samples reached 0.770, SEP 1.151 °Brix. The curve of the sugar content of banana after ripening showed a linear trend within 6 °Brix. The results showed that when bananas were stored at 13 °C, one kg banana need the ethylene absorbent dose with 4 g, which can effectively decrease the ethylene caused by the difference between spontaneity and vibration during transportation, and can effectively slow down the banana ripening rate.

References

- [1] R. T. Hinsch, D. C. Slaughter, J. F. Thompson, and W. L. Craig, "Vibration of fresh fruits and vegetables during refrigerated truck transport," *Trans-ASAE.*, vol. 36, no. 4, pp. 1039-1042, 1993.
- [2] D. C. Slaughter, J. F. Thompson, and R. T. Hinsch, "Packaging bartlett pears In polyethylene film bags to reduce vibration injury in transit," *Trans-ASAE.*, vol. 41, no. 1, pp. 107-114, 1998.
- [3] E. J. McMurchie, W. B. McGlasson, and I. L. Eaks, "Treatment of fruits with propylene gives information about the biogenesis of ethylene," *Nature.*, vol. 237, pp. 235-236, 1972.
- [4] J. Y. Chang, "Introduction to hull vibration. *Marine Technology.*", *Marine Technology.*, vol. 14, pp. 75-99, 1994.
- [5] S.P. Burg and E.A. Burg, "Relationship between ethylene production and ripening in banana," *Bot. Gaz.*, vol. 126, pp. 200-204, 1965.