

# Compositional Estimation of Grape by Short-Range Remote Sensing Measurement Using Artificial Light Source

\*齊藤 大晶<sup>1</sup>、Mohamed Thaheer Ahmad Shaqeer<sup>1</sup>、佐藤 朋之<sup>2</sup>、高橋 幸弘<sup>1</sup>

\*Hiroaki Saito<sup>1</sup>, Ahmad Shaqeer Mohamed Thaheer<sup>1</sup>, Tomoyuki Sato<sup>2</sup>, Yukihiro Takahashi<sup>1</sup>

1. 北海道大学 理学研究院、2. 北海道大学 農学研究院

1. Faculty of Science, Hokkaido University, 2. Faculty of Agriculture, Hokkaido University

To produce high-quality wine, it is important to monitor the growth of grapes accurately. This is typically achieved by assessing oenologically important parameters such as sugar content, acidity, and anthocyanin concentration, which are typically evaluated using chemical methods at different growth stages. However, traditional chemical methods have limitations, such as the destruction of grape berries during the sampling process and the limited number of samples that can be taken. Additionally, measuring these parameters using chemical methods is labor-intensive and time-consuming.

To overcome these issues, a non-destructive and faster method for evaluating grape parameters using hyperspectral camera measurement is promising. We are currently conducting experiments to establish a new method for estimating the grape parameters (e.g. sugar content, acidity, anthocyanin concentration, etc.) of Rondo and M. H. grape varieties using a proprietary LED light and hyperspectral camera.

In our approach, we use LED light to irradiate the surface of grapes from a distance of 1 m and measure the reflected light using a hyperspectral camera. From the obtained spectral data, we calculate the reflectance of each wavelength. Additionally, we measure the sugar content, acidity, and anthocyanin concentration of the grape using traditional chemical methods. We then conduct a search for wavelength pairs that correlate with sugar content, acidity, and anthocyanin concentration. We have achieved a high correlation ( $R > 0.7$ ) among acidity, sugar content, and anthocyanin concentration of Rondo, M. H. species, respectively.

In this presentation, we will introduce the latest results obtained based on the data accumulated by the hyperspectral camera measurement using an LED light source, which started in the middle of August 2022, with the introduction of the measurement system and the scene of measurement at the Tsurunuma Winery's field.

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