

# The color detection of two cucumber cultivars by NIR Spectroscopy

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Manuscript received: 15 October 2017. Revision accepted: 18 December 2017.

**Abstract.** Kusumiyati, Kurniasari I, Oktavia AR. 2017. The color detection of two cucumber cultivars by NIR Spectroscopy. *Asian J Agric 1*: 59-65. The color of cucumber fruit can be estimated as fruit quality trait. Genotypes and cultivars affect the color of cucumber fruit. The estimation can be done quickly and without tissue damage by NIR Spectroscopy. The purpose of this study was to determine the accuracy of color quality values with NIR and conventional methods. The experiment was conducted at Horticulture Laboratory, Faculty of Agriculture, Padjadjaran University in 2013. The color components observed were L, a, b, hue and chroma. The results indicated that the predicted component of cucumber color approximates values obtained from conventional methods. Based on the data obtained, the correlation coefficient (r) of color component approaches 1.00 and the standard calibration error (SEC) is low or close to 0.00.

**Keywords:** Cultivar, *Cucumis sativus* L., fruit color, near-infrared spectroscopy, NIR

## INTRODUCTION

One of the most important post-harvest activities on horticultural production is grouping the fruit and vegetables based on certain criteria that are called grading. Grading criteria can be determined by physical appearance and also internal chemical content inside the product. One of the judging criteria for the product is color. The color of the product is often associated with the level of maturity and taste of fruit so that the criteria could be used for grading. Color pigment becomes internal content traits of the fruits and vegetables. In a simple way, green product shows high chlorophyll content, orange color shows high carotenoid, and purple-red color shows high flavonoid. The color change of the product may characterize changes in chemical content in horticultural products.

Cucumber is one of the favorite horticultural products of Indonesian. Generally, the cucumber consumed is a young fruit and most of them will not enter the ripening phase. The cucumber fruit skin is generally green with white tinge at the lower end. The skin color of the cucumber will differ depending on the level of cucumber maturity. Cucumber fruit also changes color due to chlorophyll degradation. When associated with the color pigment, the cucumber initial color change (green on the greenish-white base toward the tip) becomes yellowish green at the base, and then the yellowish white toward the cucumber tip indicates the color degradation due to the metabolic process during storage. Visually, the color of cucumber skin can be seen directly.

Near-Infrared Spectroscopy (NIRS) is widely used for color measurements precisely and quickly at various fruit and vegetable products including cucumber. NIRS is a device that utilizes the near infrared wave color spectrum able to predict the internal quality of a product quickly and uniformly. Some research has been done to measure the internal quality of fruits and vegetables using NIRS such as

grape (Guidetti et al. 2010), tomato (Nikbakht et al. 2011), Cavendish banana (Liew and Lau 2012), mango cv Gedong (Sugianti et al. 2012), Thai mango (Watanawan et al. 2014), apple (Eisenstecken et al. 2015). Each research focuses on the internal quality determination using NIRS.

This research will predict the color of the fruit of two cucumber cultivars. According to Mladenovic et al. (2013), fruit color trait is under the influence of dominant genes. So that two cucumber cultivars are used in this study as a comparison. The prediction of cucumber color is done by using NIRS which will be compared with the assessment result using conventional method.

## MATERIALS AND METHODS

### Material sources and tools

The experiment was conducted at Laboratory of Post-Harvest, Faculty of Agriculture, Padjadjaran University from June to August, 2013. 300 fruits of cucumber (*Cucumis sativus* L.) cultivar "Bandana and Wulan" was used in this research. Portable near-infrared spectrometer (NirVana AG410, Integrated Spectronics Pty, Ltd, Australia), CIE L \* a \* b \* box was used to measure the cucumber color. A set of computers for data processing using ISIS software (Integrated Spectronics Pty, Ltd, Australia), Microsoft Excel 2007 and Multivariate Unscrambler (version 9.7, CAMO, Oslo, Norway), Adobe Photoshop CS3 were used to analyze the NIRS data.

### Procedures

#### Fruit sampling

The samples of cucumber fruit used in this study were cucumber cultivars Bandana and Wulan, were obtained from the garden located in Curug Rendeng Village, Jalan Cagak Sub-district, Subang, West Java, Indonesia. The 7 to 14 days after flowering cucumbers were selected as