

# Using Spectrophotometric Color Measurement to Optimize Quality and Efficiency in Rice Production

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There are about 482 million metric tons of rice produced globally every year and even relatively small farms typically have high output.<sup>1</sup> The average rice farm contains about 600 acres of productive growing land and this much acreage, coupled with the product, requires significant oversight through both growing and production. At a time when the cost of production is growing, this oversight becomes more important than ever to maintain profitability; in the past ten years, expenses in producing rice have jumped significantly, reaching an average of \$115 per active acre.<sup>2</sup> With rising costs and high production volume, rice farmers must now take extra steps to ensure maximum quality with every harvest.

Maintaining the quality of output, however, can be a challenge. As such, many modern farms integrate sophisticated technologies throughout the production process, facilitating crop management, harvesting, and milling. Today, a key component of optimizing quality control is the use of spectrophotometers that measure rice color, an important indicator of quality.

## Key Indicators of Rice Quality

There are many types of rice plants and potentially thousands of rice varieties which can be created by crossbreeding those plants. Due to the variation of rice from plant to plant, there's no universal system for establishing rice quality.<sup>3</sup> There are, however, a variety of factors known to indicate quality and farmers use these factors to develop their own quality criteria. They include:

- **Milling degree:** The milling degree is a clear indicator of quality, as it determines viable rice production per batch of rough, unprocessed rice. The more rice must be milled to reach optimum quality, the more product volume is lost as milling removes the outer surface of the rice, making it smaller with each pass. Meanwhile, insufficient milling can impact cooking behavior and compromise usability.
- **Whole vs. damaged grains:** The optimum size of rice grain is not determined by quality, but on overall demand. Some consumers may prefer long grain, others short. As such, rice farmers tend to grow for their market. However, one thing that is a definite quality indicator is the amount of rice which remains whole after processing, as brittle rice cooks poorly and is therefore undesirable to consumers.
- **Chalkiness:** Malformed starch granules cause rice to develop areas of thick, opaque white rather than a slightly translucent appearance throughout. This chalky white rice has a higher tendency to break during milling and is considered undesirable in most markets.
- **Whiteness/Color:** Both white and brown rice can be tested based on a whiteness scale, with different levels of white represented as numbers from one to 100, with 100 representing perfect white. For example, brown rice may measure as a 20 on this scale, while white rice measures as a 40. Anything brighter would indicate chalky rice. This scale is important to ensure all varieties of rice conform to color expectations based on successful growing practices and have an attractive appearance to consumers. The scale can also be used to correlate color to milling processes and determine how well-milled the rice needs to be to achieve optimum results.

Full article with photos available here:

<https://www.hunterlab.com/blog/color-food-industry/using-spectrophotometric-color-measurement-to-optimize-quality-and-efficiency-in-rice-production/>