



The extraordinary economic value of saffron has long led to counterfeiting and adulteration, and the problem is growing.

Image Source: Flickr user Steven Jackson

The spice trade has one of the longest and richest histories of any industry. It has built empires, caused wars, led to the discovery of new lands, and enriched both the diets and the pocketbooks of people around the globe. The establishment of spice trade routes has shaped our world in immeasurable ways and some historians argue that it sparked the beginning of the modern age itself.¹

Today, we take it for granted that we can pop into a shop and buy virtually any spice we need. But there is one spice that is so valuable that it has spurred a vast counterfeit industry, leaving both individual consumers and food industry professionals to wonder if what they are buying is the real deal. That spice is saffron, an ancient medicinal plant that, by weight, is worth more than gold. The price reflects its “difficult and labor-intensive” cultivation and harvesting processes; it takes approximately 150,000 flowers to produce a single kilogram of saffron.² As Elaine Sciolino writes in *The New York Times*, “Little wonder, then, that the precious powder has spawned a trade rife with the kind of deceptions and distortions of traffic in gems or illicit drugs: cheap substitutes, diluted shipments, false labeling.” The extraordinary value of saffron makes it more vulnerable to counterfeiting and adulteration than any other food in the world.

The problem with fraudulent saffron typically isn't safety; unlike counterfeit [pharmaceuticals](#) or [alcohol](#), people aren't dying from impure or counterfeit spices. They are, however, denied the experience of authentic saffron. “The fraud problem is immense,” says J.S. Heslop-Harrison, a genetics professor at the University of Leicester. “The use of fakes means that people do not realize the special taste and aroma of real saffron.” For companies that sell or use saffron, however, the problem is more serious than being denied a culinary delight; adulterated and fake saffron can deeply damage company reputations, lead to significant fines as countries crack down on product mislabeling, and divert profits from legitimate producers. As concerns about the authenticity and purity of saffron grows, the food industry is increasingly turning to

spectrophotometric analysis for fraud detection, saffron adulteration testing, and saffron quality determination.



Increasingly complex supply chains are making food fraud easier and more prevalent than ever before, spurring the need for rigorous auditing by commercial food companies to verify saffron authenticity.

Image Source: Flickr user Guillaume Paumier

The Need for Saffron Adulteration Testing

In today's increasingly complex global supply chains, food fraud is becoming easier and more widespread than ever before, particularly in high-value goods like saffron. The further removed the final purchaser of an ingredient is from its originator, the more opportunities there are for substitution, dilution, and contamination. As such, a comprehensive auditing strategy that includes testing of food products from third-party vendors is now essential to ensuring the authenticity and purity of ingredients, particularly as governments move toward zero tolerance policies regarding food fraud.

The 2014 Elliott Report, one of the most in-depth reviews of food fraud ever undertaken, strongly recommends testing throughout the food production process to verify ingredients and identify contaminants as a standard part of food fraud prevention. As the report states, "Those involved in audit, inspection and enforcement [must] have access to resilient, sustainable laboratory services that use standardized, validated methodologies."³ For commercial food companies, ongoing testing using in-house laboratories allow for the highest level of quality control throughout the manufacturing process. "These tests provide more than a back-stop against consumer complaints," says Steven Guterman, CEO of InstaLabs. "They offer brand and business protection in the food marketplace."



Spectrophotometric determination of saffron authenticity and quality ensures that commercial food companies don't unwittingly participate in food fraud and protects brand reputation.

Image Source: Flickr user Neeta Lind

Spectrophotometric Determination Aids in Saffron Authentication

To fill the need for a validated international standard for saffron authentication, the ISO has developed a UV-Vis spectrophotometric method of saffron identification and quality determination that plays an essential role in food fraud prevention:

Saffron is considered to be pure when it complies with the requirements of the standard ISO 3632 and when no external matter has been added to the natural product. The two parts of the standard, ISO 3632-1:2011 and ISO 3632-2:2010, specify test methods for the different categories of dried saffron included powder, filaments and cut filaments. The standards are useful for analyzing the strength of the spice's flavour, aroma and colour as without these, the fake saffron has no culinary value. In addition, they help laboratories to detect if the saffron is pure or not, that is to say if foreign matters are detected in the product.⁴

The method works by identifying the unique spectral fingerprints produced by crocin, picrocrocin, and safranal, the compounds that give saffron its famous color, flavor, and scent, allowing you to [verify the presence of saffron and detect contaminants](#). However, saffron fraud isn't just limited to substitution or dilution; in an effort to push the price up and maximize profits, even legitimate producers of authentic saffron can cut corners and compromise quality. Spectrophotometric analysis gives you a rapid, economical, and objective basis for determining saffron quality to ensure that the ingredients you buy and the products you sell meet the standards of your customers. For even more detailed saffron analysis, small sample and non-destructive spectrophotometric methodologies may be used to determine moisture content, country of origin, and coloring strength, giving you unprecedented insight and quality control while [preserving valuable product](#).⁵

HunterLab Quality

HunterLab has been a pioneer in spectrophotometric technology for over 60 years. In that time, we have helped our customers in the food industry implement the highest level of quality control throughout their manufacturing processes using the most sophisticated testing tools available. Today, we offer a comprehensive range of user-friendly portable, benchtop, and on-line spectrophotometers, allowing you to easily test products in virtually any environment, whether in the lab or on the factory floor. [Contact us](#) to learn more about our renowned spectrophotometric instruments, customizable software packages, and world-class customer service and let us help you select the perfect tool for your analytical needs.

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