The Grain Quality and Nutrition Center (GQNC) helps breeders incorporate high quality and nutritious traits into new germplasm (through Grain Quality and Nutrition Services Laboratory, GQNSL). The globally competitive GQNSL offers fee-based services to clients within and outside IRRI. Its analytical service arm has been accredited to ISO/IEC 17025 standards, certifying its high quality testing services on rice plant and grain, as well as soil and water samples. For more information visit our website (http://gqnsl.irri.org) or contact us at gqnsl@irri.org.

The center also provides capacity-building in research domains that draws on cutting-edge grain quality insights to support breeding through post-genomic resources.

Our goal is to create sustainable, restructured rice breeding programs that deliver better-quality rice in high yielding backgrounds through precision breeding for targeted consumer segments.

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Rice science for a better world

International Rice Research Institute (IRRI)

IRRI is the world's premier research organization dedicated to reducing poverty and hunger through rice science; improving the health and welfare of rice farmers and consumers; and protecting the rice-growing environment for future generations. Headquartered in the Philippines and with offices in 17 countries, IRRI is a global, independent, nonprofit research and training institute supported by public and private donors.

IRRI breeds and introduces advanced rice varieties that yield more grain and better withstand pests and disease as well as flooding, drought, and other harmful effects of climate change. The Institute develops new and improved methods and technologies that enable farmers to manage their farms profitably and sustainably. IRRI recommends rice varieties and agricultural practices suitable to particular farm conditions and consumer preferences. Finally, IRRI assists national agricultural research and extension systems (NARES) in formulating and implementing national rice sector strategies and programs.

IRRI

IN SEARCH OF THE PERFECT GRAIN

At IRRI's Grain Quality and Nutrition Center, we:

- tap into the genetic diversity of rice to identify superior lines;
- validate grain quality through sensory profiling;
- widen the breadth of phenotypic assessments by unraveling metabolic signatures; and
- mine the genome for grain quality and sensory attributes to identify markers reflecting consumer preferences.

Sensory evaluation as a tool in understanding rice grain quality

We utilize objective sensory evaluation approaches to establish descriptive profiles of rice. Attributes that are not associated with current indices of rice eating quality can be quantified, including those that are not yet articulated but are distinguishable by consumers. These efforts complement current routine physicochemical indices of eating quality and may provide a more comprehensive definition of grain quality.

Metabolomics

The study of metabolites or products of metabolic reactions in cells (metabolomics) is important in capturing the molecular information associated with certain rice quality traits. We aim to characterize the genetic diversity in rice germplasm through metabolomic profiling. This is being done in collaboration with private and public research institutions.

Rice grain digestibility and glycemic index

Starch is a major component that influences the nutritional property of rice grains. We analyze the structure and composition of starch to determine its role in digestibility. We also collaborate with other laboratories to screen for low glycemic index and high resistant

starch content in rice and to contribute to the development of novel rice cultivars that can be used to mitigate hunger and address health problems, such as obesity and diabetes.

Grain quality genomics

Grain quality traits are complex and controlled by many major and minor quantitative trait loci (QTL). Grain quality genomics probes deeper into the genetics of these complex traits. This is made possible by advanced bioinformatics tools and methodologies to do genome-wide association studies (GWAS) and functional analyses of finely-mapped regions of the rice genome to identify diagnostic grain quality markers.

Bridging grain quality with sensory attributes

Physical Quality
- Chalk
- Head rice yield
- Size and shape

Biochemical composition
- Amylose content
- Gel temperature
- Gel consistency

Starch

- Viscosity

Starch-Protein

- Aroma   2AP- >100 compounds

Eating Quality
Cooking Quality
- Sensory panelists
- Rheology & texture
- Exploring high-throughput technology based sensory profiling