Dale Bumpers National Rice Research Center
USDA-ARS
Stuttgart, Arkansas

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MONTHLY RESEARCH HIGHLIGHTS

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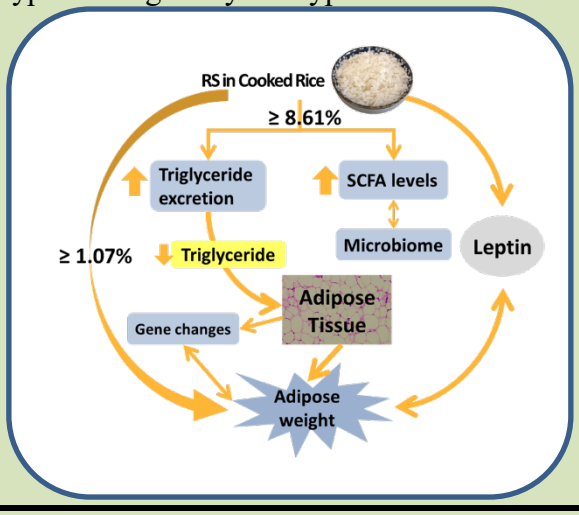
- **Recent Scientific Publications**

This addresses USDA-ARS Research Goal: Development of crop plants with enhanced nutritional quality

Wan, J., Wu, Y., Pham, Q., Yu, L., Chen, M.-H., Boue, S.M., Yokoyama, W., Li, B., Wang, T. 2019. Effects of rice with different amounts of resistant starch on mice fed a high-fat diet: attenuation of adipose weight gain. J. Agri. Food Chem. DOI:10.1021/acs.jafc.9b05505.

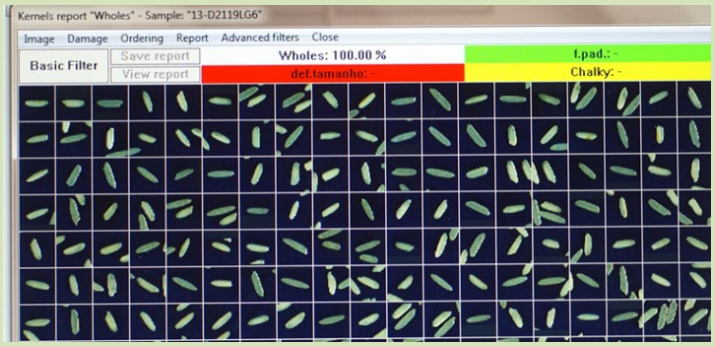
Chronic disease is the primary contributor of death and health costs worldwide. A large number of chronic diseases are directly related to diet, such as obesity, type II diabetes, and cardiovascular disease. More than 2/3 of adults and 1/3 of children in the USA are overweight or obese, mainly due to their eating patterns and food sources. Therefore, there is an urgent need to identify healthy diets and/or foods that may overcome these public health issues. Rice is a staple food around the world and is a main source of starch providing dietary energy. A portion of the starch is resistant starch (RS), a type of dietary fiber which resists digestion in the small intestine. Increasing the amount of RS in the diet may confer protective effects on chronic diseases. To address this question, we examined the effects of cooked rice containing different levels of RS in rodents using a diet-induced obesity model. Rice containing RS as low as 1.07%, reduces weight and size of fat cells induced by a moderately high-fat (HF) diet. RS in rice at 8.61% modulates HF diet-induced triglyceride uptake and inflammation of the adipose tissue and increases excretion of triglycerides in feces. Hence, including rice with RS level at ≥ 1.07% may attenuate risks associated with moderately high-fat diet. A typical US long grain rice which has intermediate levels of grain amylose content contains RS at 1.0-1.8% type and high amylose types of rice have 2.5-2.8% RS.



This addresses USDA-ARS Research Goal: New phenotyping approaches for important traits

McClung, A.M., Chen, M.-H., Jodari, F., Famoso, A.N., Addison, C.K., Linscombe, S.D., Ottis, B.V., Moldenhauer, K.A.K., Walker, T.W., Wilson, L.T., McKenzie, K.S. 2019. Use of objective imaging systems to assess subjective grain appearance traits important to the USA rice industry. Cereal Chemistry DOI:10.1002/cche.10251.

Grain appearance traits like grain shape, grain uniformity, grain color, and grain translucency impact determine the grade of rice, its price and marketability. These grain traits are evaluated subjectively in the USA by officially trained inspectors and at commercial rice mills. There is interest in determining if digital imaging systems (IS) provide an alternative means to objectively and rapidly measure these traits. This would help producers, buyers, and researchers be assured that rice samples are graded in an efficient and consistent manner. The goals of this study were to compare appearance traits commonly assessed by the USA rice industry as determined visually by inspectors (VI) and using IS and to identify IS parameters that predict VI assessments. Grain chalkiness as determined by commercial mills, a rice exporting company, and government inspectors, differed from results using three IS: WinSeedle, SeedCount and S21 (pictured below). However, all six methods agreed on ranking of the best and worst of 20 US cultivars for chalkiness. This suggests that human assessment of grain chalkiness was less discerning than digital imaging systems. In addition, quality parameters easily and rapidly obtained from the IS were useful in explaining VI ratings for bran streaks, chalk, kernel color, uniformity length and appearance overall as determined by commercial mills. In conclusion, IS can rapidly quantify rice grain appearance traits but agree with subjective ratings for chalkiness only when differences are extreme.



- **Technology Transfer**

  ✓ **<u>To Non-Research Stakeholders</u>**

  On Dec. 9th, Dr. Ming-Hsuan Chen assisted a local milling company on evaluating their rice reference materials for grain quality analysis.

  On Dec. 13th, Dr. Anna McClung provided guidance to a Texas company on methods for identifying offtypes and producing pure seed of specialty rice varieties.

On Dec. 20th, Dr. Ming-Hsuan Chen provided rice reference materials to a private company interested in developing instrumentation to measure amylose content in rice.

On Dec. 20th, Dr. Anna McClung discussed genetic diversity, gene banks, and genetic mapping as well as traditional breeding methods and gene editing techniques as a means of developing rice varieties that are resilient to climate change with a journalist for Wired magazine.

✓ **To Research Community**

On December 16, Dr. Yulin Jia provided information on rice diseases in the USA to a US university professor for guiding graduate students to investigate rice diseases observed under greenhouse conditions.

✓ **Germplasm Exchanged:**

During the month of December, 54 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the United States and the United Kingdom.

- **Education and Outreach**

On Dec. 20th, as part of the annual Holiday activities, DBNRRC employees came together to collect items to create children's goody bags to donate to the ICCM (Inter-Church Community Ministry) Foodbank in Stuttgart. Forty-five goody bags were distributed - each included a winter hat, pair of gloves and a pair of socks, as well as holiday candies, fruit cups and lip balm. In addition to the goody bags, 54 lbs. of food items and cash donations were delivered to ICCM collected by staff at DBNRRC.