Should Soil Testing Services Measure Soil Biological Activity?

Healthy soils are needed so that agriculture can continue working for us by producing abundant food, feed, and fiber in the face of climate change and rising input costs. A key question these days is “how should we measure the health of soil?” A seminal indicator is the breath (respiration) of soil. Like us, soil is living and therefore breathes—and the more it breathes, the more it needs to be fed. But the more it’s fed, the more work the soil is also able to do.

This is the message of an open access article in Agricultural and Environmental Letters by USDA-ARS soil scientist, Alan Franzluebbers from Raleigh, NC. As a USDA professor in the Department of Soil Science at North Carolina State University, Franzluebbers is working with graduate students and other researchers across the Mid-Atlantic region to define the indicators of healthy soil. A test that allows dried soil to breathe for a short period following rewetting is producing strong indications of how well soil offers crops nitrogen that is de-mineralized from organic matter. Soil that has been fed a robust, diverse diet of crops and been kept intact with conservation tillage works hard to provide sufficient nitrogen to crops. In contrast, not knowing how much nitrogen is really available often leads to over-application of fertilizer and environmental degradation.


Nitrogen, Harvest Moisture, and Cultivar Selection Effects on Rough Rice and Milling Yields

Proper on-farm practices in Mid-South rice production are key to optimizing production and profitability. As 85% of rice is produced for human consumption, it’s critical that milling yields (i.e., milled and head rice yield; HRY) are considered when developing management practices. Fertilizer nitrogen (N) and harvest moisture content (HMC) are important factors for maximizing rice yields; however, data is lacking on the interaction of these factors with modern hybrid and pure-line cultivars.

In a study in the March–April 2016 issue of Agronomy Journal, researchers reported the response of rice cultivars during a three-year study in Arkansas where rice was fertilized at five N rates and grain harvested at high (220–240 g kg⁻¹), medium (180–200 g kg⁻¹), and low (140–160 g kg⁻¹) HMC. At N rates required to maximize rough rice yields, milling yields were 98 to 99.9% of the maximum milling yield within most cultivar-HMC combinations. The exception was the pure-line cultivar, Wells, harvested at low HMC.

In general, applying N at rates needed to maximize rough rice yield and harvesting at high and medium HMC led to near-maximum HRYs. In contrast, rice harvested at low N rates and HMC reduced HRY. Understanding cultivar-specific interactions with fertilizer N rates and HMC will ensure best management practices are implemented that produce optimal rough rice and milling yields. This, in turn, will minimize over-application of N, which does not improve rice yields, but could have negative impacts on the environment.