

New Technology Guide

New generation of portable moisture meters

VILLA PARK, Calif. — After all the hard work of tilling, planting and tending throughout the year, farmers need an accurate moisture meter to help them optimize the fall harvest, whether it involves wheat, barley, soybeans, rice or other agricultural products.

For farmers, quickly measuring samples in fields to determine which are ready to harvest reduces uncertainty and saves time. It also reduces the risk of buyer rejection due to improper moisture content and maximizes the sales price by enabling the optimum amount of moisture to be counted toward product weight or volume. Measuring moisture content also is essential to prepare and store grains to preserve quality and longevity while deterring spoilage.

While monitoring rainfall, irrigation and temperature is necessary, it is not sufficient to determine the best time to harvest in order to achieve ideal water content. Inevitably, there is always some variation in water content within crops that farmers cannot estimate with any certainty.

Not only do rainfall, temperature and weather vary from year to year and season to season, but also water content varies within the crop itself. On a large farm, rice paddy, or orchard, one crop on an adjacent lot can always be ready to harvest before another.

“Without periodic test-

ing within various fields or plots, farmers will miss out on optimizing both quality and yield — which produces the payday that they must survive on, or ideally thrive on, for the rest of the year,” said John Bogart, managing director of Kett, a manufacturer of a full range of moisture and organic composition analyzers.

Fortunately, a wide range of accurate, portable and easy to use yet durable moisture meters are now available to farmers that will enable them to harvest at exactly the right time, as well as adjust moisture content as necessary to maximize profit.

EASING MEASUREMENT

For farmers requiring quick moisture measurement in the field, traditional equipment has been too slow and cumbersome for frequent spot checks. One conventional test, Loss on Drying, measures the total material weight change after drying.

The test involves taking a sample to an air oven for manual testing — weigh, oven dry, weigh — which can take two to 48 hours to complete depending on the standard. Alternately, if an automated moisture balance — an integrated weighing and heating unit — is used, testing can take up to 15 minutes. Either way, such testing can be too slow when more immediate measurements, or a high quantity of measurements are required.

As a result, secondary test methods have typically been used to deliver faster results. This type of test uses an indirect method and a single conversion to achieve accurate results.

If there is a disadvantage, it is that the secondary instrument must first be calibrated to ensure accuracy. In some cases, calibration can only be performed by trained staff familiar with the equipment.

In response, many agricultural moisture meters have simplified the process, using capacitance technology. Capacitance is a measure of an electric charge separated from a given electric potential; it exists between two conductors insulated from each other.

The dielectric capacitance technology commonly used in grain moisture meters is based on the relationship between a grain’s moisture content and its dielectric constant.

As its moisture content increases, its dielectric constant increases. Since the rate at which the dielectric constant increases is different for individual grain types, a unique calibration is necessary for each grain type.

TESTING SINGLE GRAINS

To get the best price after harvest when growing rice and grains such as barley and wheat, farmers often need to optimize for grain quality and consistency.

This entails measuring the moisture of individual grains in different fields until the ideal statistical distribution is reached.

Today, transportable single grain moisture testers can quickly measure the moisture within each grain of rice, barley and wheat, allowing farmers to determine the moisture content of individual seeds within a sample with the results displayed on an LCD screen. This is achieved in minutes without sample preparation.

“The number of kernels tested, the average moisture and a histogram detailing the distribution of moisture values are displayed,” Bogart said. “This allows farmers to make immediate decisions regarding product quality and homogeneity to maximize the sale price.”

“When farmers reach what they consider the optimal moisture level using a single grain moisture tester, that is the time to harvest in order to get the most consistent rice or other grain with the best yield,” he added.

According to Bogart, such devices are simple to use. With advanced models like those from Kett, farmers select the calibration, pour a sample into a hopper and press the “measure” button.

Such models are factory-calibrated for wheat, brown, polished and paddy rice, as well as naked and standard barley. The de-

vices are versatile, capable of measuring from 10 to 1,000 kernels in each batch, at 150 kernels per minute.

When farmers need to test a wider range of agricultural products, some advanced portable grain and seed moisture meters using capacitance technology offer instant measurement and over 150 calibrations of the most common grain and seed types.

While some agricultural devices may require grain husking and grinding, no sample preparation is required with the latest generation of portable, battery powered devices.

Tests are simple. Pour the sample into the machine and the moisture content and density are instantly displayed. Automatic averaging enables quick spot check measurement of samples in bulk containers. To document such tests, such units offer digital output to a computer or optional printer.

In terms of accuracy, however, Bogart offers a word of caution when selecting such a unit.

“While many moisture meters using the dielectric principle claim to provide accuracy to +/- 0.5%, to achieve such accuracy it is important to look for a unit that provides automatic density and temperature compensation. This is because changes in ambient, sample, or device temperature will otherwise degrade measurement reliability,” he said.

When greater accuracy

is needed across the widest range of grain, seed, or other agricultural product types, the most advanced moisture meters utilize near-infrared light, a highly accurate, non-contact, secondary measurement method that can deliver immediate laboratory quality moisture readings.

“NIR moisture meters follow the principle that water absorbs certain wavelengths of light,” Bogart said. “The meter reflects light off the sample, measures how much light has been absorbed, and the result is automatically converted into a moisture content reading.”

According to Bogart, such meters allow very accurate instant measurement of any agricultural product without contact or sample preparation, so there is no contamination in handheld and online models.

“Once the meter has been calibrated against the lab or production standard, the calibration is stored in the device so no calibration is required in the field,” he said.

Unlike air ovens or even moisture balances, portable NIR equipment is designed for ease of use. With the most advanced units, the user simply points the instrument at the grains, seeds, or agricultural product. The moisture content is instantly shown on a digital display, with results accurate to 0.01% in a 0% to 100% measurement range.

BAYER

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If you enroll in Bayer’s carbon program, can you still receive money from the Natural Resources Conservation Service and other government programs or do you have work strictly with Bayer’s program?

“I don’t know. There are a lot of programs out there. I don’t know the nuances of those other programs in terms of can you participate in more than one. I would say generally, when you are sequestering carbon, based on a new practice and that practice is identified, you need to determine where that carbon gets sold. Just like your grain in your field, you pick — am I going to take this grain to town or am I going to put it in a bin? But you can’t do both with the same grain. It’s kind of the same thing. You have to generally determine which path you want to go down versus double-dipping in multiple programs. I can’t speak to all programs and the nuances of those, so that’s the caveat I’d put on that.”

On the incentive, is it \$10 per acre or can you get \$10 for no-till and another \$10 per acre for cover crops?

“The pilot program was the one I referenced that we were offering \$10 an acre at that time. It didn’t matter if you were adopting cover crops as the new practice, no-till as the new practice or both. In that combination, you couldn’t just adopt cover crops without no-till. Every other combination you could do no-till by itself, you could do no-till with cover crops. If you were already doing no-till you could add cover crops, but it didn’t matter in terms of the incentive. The \$10 per acre applied to either.”

What happens if the credits are worth more than the \$10 per acre Bayer is offering?

“I think that’s the choice farmers will have. Who do you want to partner with around carbon? I think that right now, there’s no established firm market here in the U.S. for carbon yet. There probably will be a lot of choice there and you will have that choice in front of you. Where we’re try-

ing to come at this is to be a really solid choice for you and not only from a revenue opportunity, but from the data platform and making it really simple for you to assess carbon and evaluate that going forward. I do think if there are more opportunities in other programs, you are always going to have that type of choice, to look at those.”

What is the value to a corporation for carbon long term? Is it just due to public pressure and sustainability or is there true, tangible monetary value?

“We are very serious as a company. I think there’s value here long term for all of us. I think it’s an exciting space. It’s certainly gained a lot of press here recently, but I do see long term opportunity here with this. There’s a lot of interest and it’s growing. I think for us to get involved and make sure ag is represented in this space and is a valid and key component to helping with this problem, with this global problem, has long-term aspects to it.”

Jeannine Otto

GSI advises farmers to plan now for grain system projects in 2022

ASSUMPTION, Ill. — With record demand this season for new or expanded grain storage systems, dealers are already busy taking customer orders for projects in 2022.

Gary Woodruff, GSI district manager, reminds farmers it’s essential to carefully plan their grain systems before rushing to order new equipment.

“Because of the extremely tight bin supply industrywide, many farmers are looking at ordering equipment now to install after harvest or even into 2022,” he said. “But those considering these investments need to keep in mind there are still basic decisions and goals to be met in their grain system design that should not be overlooked, even though installation is many months away. Don’t put the cart in front of the horse.”

Here are some of the key issues Woodruff said farmers need to discuss

with dealers in the planning process:

FUTURE GROWTH

Think beyond immediate needs by leaving space for additional bins in the future. Have a well-thought-out plan that factors in growth and future technology changes. Plan a layout that supports expansion in an organized way without wasting space or money.

DRYING CAPACITY

If your wet storage bin was full before the end of each day during the past harvest, it may be time to increase drying capacity. With higher yields, as the total number of bushels increases, plan on adding a higher capacity dryer or an additional unit.

GRAIN HANDLING

Consider creating a traffic pattern for separate grain dumping and loading stations to increase

efficiency. Being able to load and unload grain simultaneously will save time and improve harvest efficiency. Make sure unload capacity is adequate to avoid a bottleneck today or in the future as the farm and yields grow.

LOCATION

If installing a grain system on a new site, it should ideally be situated on a state highway that allows you to haul grain year-round without road restrictions. Access to natural gas will keep drying costs to a minimum, but LP gas can be used anywhere, and good roads will ease its delivery.

The location should also provide access to three-phase electric power, which allows operation of much larger machines and motors.

For smaller systems, single-phase power may be sufficient, but more power will be needed as the system expands.