

# Leaf Scanner Reveals Crop Health In Seconds

Forget about leaf tissue tests. A new handheld scanner does everything a tissue test can and more. LeafSpec provides a non-destructive view of plant tissue, displaying the results immediately on a smartphone app. The entire process takes 10 sec. or less.

"Farmers can use it to measure crop nutrient levels in the plant, such as nitrogen and phosphorus," explains Jian Jin, LeafSpec. "It can identify disease symptoms, like tar spot and northern blight, as well as damage caused by herbicide products from different modes of action."

Jin notes that researchers can use the LeafSpec to gain an even better understanding of plant growth and health.

"For the first time, they can access a real hyperspectral image with both high spatial resolution and spectral resolution," says Jin. "This will allow them to apply advanced artificial intelligence to explore new plant features in both dimensions."

Jin explains that the LeafSpec sensors can measure light reflectance spectrums from up to 400 color bands from 400 nm (nanometers) to 1,000 nm. Human eyes can sense only three bands.

All functions of the device are integrated onboard, included in the phone app or run on a computer. The image is immediately processed with an onboard microprocessor. Each measurement is georeferenced and automatically saved. However, not all LeafSpec sensors are the same.

"We've developed a family of LeafSpec sensors with hyperspectral, multispectral and RGB microscope scanners," says Jin. "We also developed various versions to accommodate various species, such as wheat, corn and soybeans, with different sizes and shapes of the leaves. The multi-device measures only six to eight bands, but allows people to see detailed disease symptoms and nutrient deficiencies."

Jin leads the research team at Purdue University that developed LeafSpec. He founded LeafSpec LLC to bring the device to market.

"Currently, our company is working only with customers from the large crop breeding companies and plant scientists from universities and research institutes," says Jin. "However, we recognize there's a big market to serve farmers, most probably through field

scouting consultants. We're currently looking for business collaborators to introduce LeafSpec to this market."

LeafSpec measures only 10 in. by 3 in. and is designed to fit the operator's hand, explains Jin. The battery is designed for 10 hrs. of use, enough for a full day of scanning.

The device can be hand-held. However, the research team has also adapted it for use with a robotic arm and a drone. The latter allows remote sampling at predetermined sites in a field.

The device requires an internet connection to upload the georeferenced results. When internet service is unavailable, the data is stored locally and retained until an internet connection is established. At that point, it'll be uploaded automatically.

Quotes for a device are available upon request. The price includes the device and the app, as well as basic image processing functions. Advanced software, such as the corn nitrogen content predictor, requires license fees. With devices normally manufactured only several times a year, there's usually a one to two-month wait. However, rush orders are accepted.



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James built a custom Gibson tractor from spare parts, which he could use to do various chores around his farm.



## Gibson Tractor Rebuilt Using Spare Parts

FARM SHOW is always looking for unique rebuilds of old tractors, pickups or farm equipment. When we learned that Roy

"Pete" James had rebuilt a small Gibson tractor several years ago, it piqued our interest. His son Kirk says he rebuilt the Gibson to

occupy his time because he was confined to a wheelchair, using spare parts acquired from a friend who collected Gibsons.

Pete identified his finished tractor as a Model A, but it had parts from a D and other Gibsons. He stamped an ID number into the rail with a prefix and four numbers indicating it was a 1946 model. The illegible numbers didn't coincide with actual Gibson nameplates, so Kirk says they called it an imposter.

Though the tractor rebuild didn't have the exact features of an A, it worked well for Pete's needs. He equipped it with a front-mounted blade, used it for a variety of yard jobs and worked his garden with a one-bottom plow.

The chassis was from a Model A, with an original front axle and 16-in. rear wheels. Weights were added to the rear wheels for better traction. The Wisconsin engine and drivetrain were also from an A. Pete added an electric starter on the left side of the engine, which engaged when he moved the clutch pedal lever a full stroke. He placed the battery

with its grounding shutoff under the operator's seat, on top of the chain transmission drive housing. Kirk says it looked like a factory install.

Pete added grab handles on both sides of the frame for easier access to a larger-than-normal platform he built. Kirk says his dad, even though his legs were paralyzed, could drive the tractor without any problems. He made hand levers to control the original foot pedals. He finished his build with a backrest on the seat, painted it royal blue, and accented it with red wheels and a bright red gas tank.

After Pete passed away in 2006, all three tractors remained in the estate. Kirk has the E, his nephew has the D, and they decided to sell the custom A in 2024. Aumann Auctions listed the tractor and sold it online for \$630, a price that included both the front blade and the one-bottom plow.

Contact: FARM SHOW Followup, Kirk James, Greenup, Ill.

Purebred Red and Black Angus breeders Dwayne and Scott Fettes are making better beef cattle with fodder. They went from putting up hay to putting out fodder, which they've done now for six years. They've seen the difference in herd security and the cattle they sell, whether fed cattle or breeding stock.

"With our fodder production system in place, we know we can get through a drought without selling off our cattle," says Scott Fettes. "The higher digestibility of the fodder is so much higher than dry hay. It lets us use lower-cost slough hay or second-year hay."

Fettes notes that fodder is a natural living organism going into the cow's belly.

"Turn cattle onto green grass, and they instantly look healthier," he says. "That's how it is when you feed fodder year-round. The result is the healthiest cattle we've had in a long time."

Making fodder didn't just happen. Fettes and his son Eric researched the benefits of fodder and how dairymen were using it in their rations.

"We talked to people all over North America to learn what they were using and how it worked," recalls Fettes.

The farming partners began by purchasing a plug-and-play continuous-rotation indoor fodder system. However, it didn't

work as promised.

"We were supposed to be able to hook up the water and power, and it would be good to go," says Fettes. "It wasn't. Even things like the drain being above the level of the floor."

Scott and Eric began working on a redesign. The current system is a 780-sq. ft., climate-controlled grow room housed inside a 40 by 60-ft. shed. It features spray foam-insulated walls with a floor that slopes toward a slotted drain.

An in-floor heat system supports fodder growth. However, between the insulation and the heat given off by the growing fodder, it's seldom needed.

"The boiler doesn't kick in until the temperature drops well below zero," notes Fettes.

The 7 1/2-ft. long grow trays are loaded with seed that has soaked during the day and drained overnight. With perfect conditions, they produced as much as 10 lbs. of barley root mass per day for every pound of seed.

"My wife Tina runs the system," he says. "She produces the feed value equivalent of five big round bales of hay with an hour of work per day."

Recently, they switched to a six-day rotation from seven.

"It gained time, made the trays easier to clean and reduced the risk of mold," says

Fettes. "It reduced the pounds produced per day, but the energy level is still there, so the benefits balance out lost pounds. We're still averaging 8 lbs. of fodder per pound of seed."

The system consists of seven racks of 28 trays. Each day, the garage door on the fodder room opens, and the day's fodder is pulled out of trays. It drops into a tractor loader bucket before being dumped onto the ground for the cattle. Trays get a quick wash with a bleach solution before being refilled.

The amount of fodder an animal gets and which animals get it varies. Fettes notes that they try to make sure every animal gets a share. He describes it as a balance between producing as much as can and where the greatest need is at the time.

"We try for about 6 lbs. of fodder per animal per day," says Fettes. "Weaned calves go on a heavier fodder ration in September. In March, we increase the amount fed to cows after calving and before breeding. It flushes them out and gets them cycling."

Fettes knows that some controversy remains as to the value of fodder; however, it began proving itself in its first year.

"We had a 200-bale carryover the first year and again the second," he says. "We never had carryover before."

Fettes offers a consulting service to folks



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wanting to build their own system. He's currently working with producers in eastern Canada on fodder production systems.

One advantage of his consulting is that his customers share improvements they make.

"Every year we make improvements," he says. "We're still learning."

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