

Autonomous Crop Scout IDs And Maps Weeds

Five years after introducing drone-based precision mapping of stones (Vol. 45, No. 1), TerraClear has added precision mapping of weeds. Stones 8 in. and larger are mapped by an aerial drone, while weeds are mapped by a surface-level drone called TerraScout. The key to both is the AI program that analyzes high-definition images and delivers maps and data to the operator's app.

"We began development of a ground-based solution in 2023 and conducted initial field testing of a non-autonomous system in the spring of 2024 and through the 2025 growing season," says Charles Stover of TerraClear. "We began tests of our first fully autonomous system in fall 2025."

The TerraScout prototype is powered by a 48-hp diesel engine with approximately 7 hrs. of runtime. However, Stover notes that current testing includes a 65-hp Kubota.

"We're continually reviewing high-productivity and cost-effective options," he says.

It covers a 60-ft. swath at speeds up to 15 mph and can detect weeds as small as 1/4-in. and record their positions in the field. The introductory unit weighs 4,500 lbs. but delivers only 4 psi to the ground, thanks to Mattracks XT UR HD tracks.

Aside from the engine, the only other major components not custom-built by TerraClear are the tracks and the independent hydraulic wheel motors.

Eight cameras provide high-resolution imagery at 1 mm accuracy. By comparison, the company's rock-identifying aerial drone operates at 5 mm resolution. At that

resolution, a single acre is captured as 162 million pixels, each the size of a pencil eraser. The AI uses that level of definition to identify weed species and density and to calculate chemical effectiveness.

"TerraClear chose to develop our own autonomous system as there's currently no third-party system on the market that meets our needs relative to speed and perception," says Stover. "The AI detection and perception models are proprietary to TerraClear and are specifically architected to support the high-resolution, differentiating features and real-time generation of our mapping solutions."

On-board edge compute delivers the maps and prescriptions to the app on the landowner/operator's iOS or Android device.

According to Stover, TerraScout will be in the field with select farmers and partners in 2026 to conduct further testing under commercial field conditions.

Stover notes that TerraScout and weed mapping will supplement smart spray systems and integrate with Farm Management System (FMS) software.

"Prescriptions will be loaded as third-party shapefiles to a farm's FMS to work with section-control and individual nozzle-control sprayers," says Stover. "Benefits include knowing the types of weeds in the field and helping determine appropriate modes of action and the total amount of product to mix going to the field."

TerraClear uses the term "killocity" to describe the TerraScout AI's ability to assess a weed's height and help inform farmers and applicators about how effective a given

chemical will be in managing the weed.

"Commercial release is targeted for 2027," says Stover. "When it's launched, there will be several options for utilizing TerraScout."

On the rock-clearing side, TerraClear offers Rock Maps, Rock Picking Services, and the outright purchase of its proprietary TC100 Rock Picker.

The unique and innovative picker weighs just under 2,000 lbs. It can be mounted to any tractor, skid steer or compact track loader with a rated capacity of 3,100 lbs. and a flow rate of 18 gpm. In medium-to-high rock density, the TC100 can pick up 400 rocks per hour.

"We currently offer rock mapping and rock picking services in 13 states throughout the Midwest and Northern Plains, as well as the prairie provinces of Canada," says Stover. "We work with a variety of service providers. In some instances, they only fly drones or operate rock pickers. In other instances, they do both. If FARM SHOW readers are interested in doing either, reach out to us for more information."

Larger-scale farming operations can participate in TerraClear's Fly Your Own program, using their own drone and aerial edge processors to develop rock maps at scale. The drone must meet TerraClear's required specifications.

Use of Rock Maps isn't limited to TerraClear's TC100 Rock Picker.

"Rock Maps can be used with any rock-picking method," says Stover.

TerraClear's suggested price for the Rock Mapping service is \$3.95 per acre. Stover



TerraClear rock map.



In-cab operator view.

notes that discounts and incentives are offered occasionally. Rock-picking services cost an additional \$3.50 to \$14.50 per acre. Service providers provide custom quotes for each job based on field size, rock density and rock size. The Rock Picker is currently priced at \$28,000 plus shipping and tax. All prices are in US dollars.

"Our new website announcing our weed management system with TerraScout has been available only since mid-December," says Stover.

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Precision Ag Program For Students

FarmBeats for Students, an agriculturally driven, technology-based educational program that integrates artificial intelligence (AI), data science and digital sensors, is currently in place, providing students with hands-on precision agriculture experience. The teaching portfolio empowers educators to spark students' interest by showcasing the exciting possibilities of combining technology with ag-based sustainability.

The program is a joint effort between Microsoft Corp. and the National FFA Organization.

As agricultural practices advance, more farmers are adopting ag-based technologies, including autonomous systems, sensors, data analysis, and AI for disease and pest control in both livestock and crop production.

Using the FarmBeats for Students kits, students assemble a simple plant-monitoring kit with environmental sensors. They collect data to assess crop health, observe plant growth, recognize climate-related challenges such as extreme heat, and identify pest influences, helping them tackle real, farm-based issues. Additionally, they explore AI by building their own machine-learning models to detect plant nutrient imbalances.

Mary Snapp, Microsoft VP of Strategic Initiatives, says, "Microsoft is committed to ensuring students and teachers have the tools they need to succeed in today's tech-driven world, and that includes giving students hands-on experience with precision farming, data science and AI."



FarmBeats program is a joint effort between Microsoft Corp. and the National FFA Organization.

She hopes this collaboration with the FFA will inspire the next generation of agricultural leaders and equip them with the skills to tackle all challenges as they guide agriculture into the future.

National FFA Organization Chief Program Officer Christine White appreciates Microsoft's generous donations and support.

"Their investment in our advisors and students is an investment in the future leaders in agriculture and eventually will help fill the void in the talent pipeline," she says. "The ability to think critically, make data-driven decisions, and apply them to real-world solutions will assist students, regardless of their eventual place in the workforce, whether going into a manufacturing position or a laboratory setting."

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In cab controls and tac.



DIY Controls Save Thousands

When Andrew Jossund's Concord Air Drill controls failed, he had two options. He could buy a new set from his dealer for several thousand dollars or make his own. He chose the latter.

"I designed my own system," he says. "It turns the clutch on the tank on and off automatically and displays fan rpms. It uses trailer wiring, a whisker switch, and a tach I found online. Best of all, it only cost about \$200."

One of the reasons the OEM replacement cost so much was that it included a bin-level sensor, a tach, and a magnetic proximity switch that energized the seed cart's clutch and started the seed monitor. Jossund's system eliminated the more expensive technology. At the same time, the use of LED lights and clear junction boxes provides him with quick visual feedback.

"A green LED lights up when the system has power, and a blue LED lights up when the seeder is lowered and the relay that powers the seed roller clutch is energized," says Jossund. "They make it easy to ensure things are working properly and to diagnose any issues without probing wires."

Jossund installed a seven-pin connector between the cart and the seeding tool and 3D-printed a control box for the tractor cab. After his first switch failed, he used a heavy-



Clear junction box with LED lights.

duty whisker switch on the frame to engage and disengage the clutch. The tach was one he found online, complete with a magnet to hold it in place.

"The problem with the original harness was that the connectors were causing problems," says Jossund. "They weren't heavy-duty enough for the job. I went with heavier-duty seven-pin connections. I made the wiring more foolproof and used off-the-shelf parts from the auto parts store instead of ordering through the dealer."

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