

Robot: Goal: Design a rock-picking tool that can be operated by anyone

Continued from Page 1

a solution existed. Someone just needed to put them together.

“When I see something, a problem that has never been solved, it motivates me to solve it,” he said.

That led to collaboration and discussions with former partners, colleagues and acquaintances.

The result was Frei’s fourth company, TerraClear, which is focused on designing a fully automated rock picker. The company officially launched in December 2017.

The goal was to design a rock-picking tool that can be operated by anyone, Frei said.

Research and development has taken 3 years and \$10 million, and the company has received a lot of input from farmers.

First, the system uses a drone to determine the size and location of every rock on a field. That information is mapped and the most efficient path for picking up the rocks is plotted.

The picker attachment hooks onto a skid steer and the driver follows the path on the map to pick the rocks.

The system works under any field conditions, such as stubble, pasture or residue.

“This thing can just pick the rock and leave everything alone,” Frei said.

Rock and roll “There are lots of other rock pickers out there,” said Heidi Linsley, the company’s marketing director. “We believe ours has a unique niche.”

Some mechanical pickers only work in certain situations, such as heavily tilled soil, and a farmer still has to scout every inch of the field, she said.

“Ours is really intended to replace hand-picking and be able to focus in on selective rock picking,” she said.

It saves a lot of time and is more efficient, going directly to where the rocks are instead of combing the whole field, she said.

TerraClear’s picker has hydraulic controls to allow for back-and-forth, up-and-



Heidi Linsley, TerraClear marketing director, talks to agriculture students during a demonstration of the company’s robotic rock picker at the College of Southern Idaho in Twin Falls on March 10.

Carol Ryan Dumas/Capital Press



Heidi Linsley, TerraClear marketing director, and Ryan Frei, head of operations for the company, explain how the robotic rock picker works.

Carol Ryan Dumas/Capital Press



Ryan Frei, head of operations for TerraClear, helps an agriculture student at the College of Southern Idaho get the hang of operating the company’s robotic rock picker.

Carol Ryan Dumas/Capital Press

down movement of the picker and in-and-out movement of the rock paddles, she said.

On average, it can pick a full loader bucket of rocks every 8 to 15 minutes, but that will vary based on the density of the rocks and the distance between the rocks and the dumping location, she said.

The company put 12 rock-picking units in the hands of farmers this spring to get their feedback before going commercial this fall.

The company also provides an on-demand service that uses a drone to map the size and locations of rocks in a field. Then the farmer can follow the map the

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For more information and videos of the rock picker, visit www.terraclear.com.

drone produces to more efficiently pick the rocks. The map shows the location and size of every rock 8 inches or larger.

TerraClear also offers a rock-picking service, a help to farmers with a short time window before seeding.

“We can whip in there and get their problem out for a few hundred bucks. The majority of people we’ve done it for want us back,” Frei said.

The next version of the picker will have a computer vision system mounted on the tractor, loader or skid steer. A driver will operate the vehicle, while the rock picker mechanically snags the rocks and puts them in the loader bucket. Prototypes are expected this fall.

The longer term vision is for a fully autonomous, independent piece of equipment. It’s still several years out, but it will be an operator-free vehicle with a picker, Linsley said.

Rock solid Most of the feedback from farmers has been positive. They have

made suggestions, but farmers like the utility of it and the ability to pick a lot of rock in a short time, Frei said.

The company recently offered a demonstration of the picker for agriculture students at the College of Southern Idaho in Twin Falls, and several were jostling for a chance to operate it.

Frei is not surprised after seeing two workers on one farm fighting over who gets to use the picker.

“It will take rock picking from worst (chore) to first,” he said.

And agriculture is taking notice. TerraClear recently gained national attention as one of four finalists in the American Farm Bureau Federation’s 2021 Ag Innovation Challenge.

The focus now is getting the picker to full autonomy, where it picks and piles rocks of its own accord — “a Roomba for rock picking,” Frei said, comparing it to an autonomous vacuum cleaner. “...It’s pretty darn exciting.”

Frei anticipated the hard part of developing a rock-picking robot would be designing a tool that could pick all sizes of rock. He gives kudos to TerraClear’s design team, which has met that challenge.

“I’ve been really encouraged,” he said.

His previous companies were successful because of great people on the team, and the TerraClear group is “the best team yet,” he said.

The company has 23 employees, all stockholders, with offices and workshops in Bellevue, Wash., and Grangeville, Idaho. The team has deep experience in software, hardware, machine learning, product development, leadership and farming.

The company will continue to work on a solution for full automation in clearing rock, which would be a game-changer for agriculture — and a relief to farm kids.

“If we’ve done a good job, farmers will love it,” Frei said.

Official warns there’s a wasp worse than an Asian giant hornet

By DON JENKINS
Capital Press

Washington and British Columbia must be vigilant against invasive wasps, including one more “ominous” than the Asian giant hornet, a Canadian official said Wednesday.

British Columbia provincial apiculturist Paul van Westendorp said he was particularly concerned about a smaller Asian hornet, *Vespa velutina*, unknown in North America but a scourge in Europe.

Its predatory behavior — it prefers honey bees — and larger nests make it more dangerous, he said. “That is a far more ominous threat.”

Washington and B.C. officials talked during a video press conference about their plans to trap Asian giant hornets, the world’s largest wasps. The hornets are considered a threat to native pollinators, the ecosystem, and people and pets that unwittingly disturb nests.

The trapping season won’t begin in earnest until July, but warm spring days will bring out queens looking to create nests.

Asian giant hornets, *Vespa mandarinia*, were unknown in North America until 2019. Genetic tests linked a hornet found in B.C. to hornets in Japan, while those found in Whatcom County were linked to hornets in South Korea. The tests are inconclusive, but suggest separate introductions.

Washington Department of Agriculture entomologist Sven Spichiger said mated queens looking for a protective place to spend the winter probably stowed away aboard ships.

“We think that’s probably how it got here,” he said. “We believe it probably hitched a ride in some kind of commodity as a fertilized queen looking to spend the winter.”

A few months before the first Asian giant hornet detection in B.C., another Asian hornet, *Vespa soror*, a sister species to *Vespa velutina*, was found in Vancouver Harbor.

Vespa velutina appeared in southern France in 2004 and has spread to Spain, Portugal, Belgium, Germany, Italy and the United Kingdom. According to the European Commission, the hornet’s



WSDA

An Asian giant hornet with the tracking device tied to it. This year, the Washington State Department of Agriculture will use kevlar thread instead of dental floss.

preference for honey bees makes it a major problem for crop pollination.

“We will be prone to future introductions of these kinds of invasive species,” Westendorp said. “This is going to be an ongoing challenge.”

“I think that’s where much of the focus should be at some point,” he said.

All 31 Asian giant hornets detected in the U.S. so far have been in northern Whatcom County. All six hornets found in Canada have been just to the north in the Fraser Valley. Washington tracked one live hornet back to a nest last year and eradicated about 500 hornets.

The agriculture department will hang about 1,500 traps in northern Whatcom County, Spichiger said.

The department also hopes volunteers in northwest Washington will hang traps, baited with either orange juice and rice wine or a less expensive mixture of one cup brown sugar and one cup water.

Hornets drown in the traps, but preliminary trapping helps the department pinpoint where it can find a live hornet. The department plans to again tie electronic tracking devices on live hornets and follow them to their nests.

Spichiger said entomologists plan this year to tie on devices with Kevlar thread, rather than dental floss, which proved no match last year for one Asian giant hornet.

“It’s really annoying to tie a tag onto a hornet and to watch her chew it off in a few seconds. It’s disheartening,” he said.

Hornets: ‘Don’t assume that if you find bees without heads that it was Asian giant hornets’

Continued from Page 1

say it will have a negative effect on agriculture is premature.

“The hobbyists who don’t move their hives are probably at biggest risk,” he said. “Most of the commercial guys have already completed their pollination.”

Asian honeybees have co-evolved with giant hornets and developed defenses, such as swarming and heating to death lone hornets. More recently, researchers have observed bees smearing hives with animal feces to repel hornets. North American honeybees, presumably, would be hapless victims.

Beekeepers already have troubles. Thompson said he’s more worried about parasitic varroa mites. Lawrence said mice and shrew decapitate honeybees, too.

“Don’t assume that if you find bees without heads that it was Asian giant hornets,” Lawrence said.

Researchers are studying the potential for Asian giant hornets to spread out from northern Whatcom County. So far, the thinking is that Eastern Washington winters are too cold for hibernating queens.

“There’s little chance they’ll ever get established here,” said Tim Hiatt, a commercial beekeeper in the Columbia Basin.

If Asian giant hornets do spread in the more temperate Western Washington, stationery hives maintained by hobbyists will be “sitting ducks,” he said.

The hobbyist beekeepers help keep the westside landscape green, Hiatt said.

“Washington has a lot of hobbyist beekeepers, and I’m really glad WSDA is involved in shutting down the threat,” he said. “Keeping invasive species from spreading is something they’re darn good at.”



ODFW

Officials are still investigating how five wolves found Feb. 9 died.

Wolves: Plan allows for ranchers to legally kill wolves that prey on livestock

Continued from Page 1

doubt about it.”

Union, Ore., and wolf committee co-chairman for the Oregon Cattlemen’s Association, said the relationship between wolves and local producers remains contentious, due in part to what he describes as “shoddy” management of the species.

Oregon’s Wolf Management and Conservation Plan allows for ranchers and wildlife officials to legally kill wolves that prey on livestock if they reach a certain number of “confirmed” depredations within a certain time period, and non-lethal deterrents have failed.

But Huffman said it is frustratingly difficult to “confirm” a wolf depredation, unless it is found and reported immediately, leaving ranchers in a difficult predicament.

“The wolf population is not a celebrated thing in cattle country,” he said. “It’s frustration, there’s no

Wolf poaching is not unheard of in Eastern Oregon. Two incidents were reported last year in neighboring Baker County — one in late September, a breeding male from the Cornucopia Pack, and another in late October, a sub-adult female from the Pine Creek Pack.

Gobush said apex predators like wolves play an important role in the ecosystem, and should be protected.

Defenders of Wildlife also supports a bill in the Legislature that would help crack down on poachers, Gobush said. Senate Bill 841 would appropriate \$1.6 million from the state general fund to support the Department of Justice’s Environmental Crimes and Cultural Resources Enforcement Unit.

The bill, sponsored by Democratic Sens. James Manning Jr., Chris Gorsek and Deb Patterson, is scheduled for a public hearing on April 5.