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Firefighters Find Soy-Based Foam Safer For Environment

By Bruce Derksen, Contributing Editor

For decades, firefighting foam has been essential for controlling fires, as it's highly effective, especially in rural America. Because of limited water supplies in remote areas, traditional foam was necessary to extend fire suppression efforts or help create fire breaks.

Unfortunately, current foams contain polyfluoroalkyl substances (PFAS), often called "forever chemicals." PFAS are chemicals that contaminate the environment, remaining in soil and water virtually forever. They're linked to several health issues, including cancers, cholesterol changes, lower birth weights, and thyroid problems.

These chemicals make excellent firefighting foams because they repel both oil and water, reduce friction, and resist temperature changes. However, due to their harmful effects, governments are banning firefighting foams that contain intentionally added PFAS.

"They've been commonly used for decades, because, truthfully, they worked awesome," says Cross Plains Solutions co-partner Dave Garlie. "But we've come to understand that they're a no-no, a total disaster. They're highly carcinogenic, and we've got to get rid of them, but what to get rid of them with?"

Garlie, along with Cross Plains Solutions, a small Georgia-based company, invented and developed the trademarked product SoyFoam TF-1122, a uniquely designed firefighting foam made from soybean meal protein. SoyFoam is a "fluorine-free" (no detectable fluorine, less than one part per billion), biobased and biodegradable product, and it's 100% free of intentionally added PFAS.

Earlier in his career, Garlie worked with a team at a large agricultural company to repurpose corn, beans and canola. This effort aimed to redirect these crops into the construction market and reduce dependence on petroleum-based, synthetic and plastic chemicals.

In the 1940s, researchers studying protein found ways to increase soybean protein content, and offshoots of that work were used during WWII to create foam fire suppressants. As these innovations proved successful historically, Garlie—a scientist by trade—analyzed and refined them and developed SoyFoam using similar principles. Made from U.S. soy and other agricultural products, SoyFoam is engineered to be safe for both firefighters and the environment.

"The tricky part was taking the soybean meal and giving it a pulpable viscosity, plus a reasonable shelf life," Garlie says. "The beauty is we're using meal, which is readily available and cheap, so we're competitive in the market."

The wetting and smothering agent can extinguish Class A and Class B fires. No special handling equipment is required, as it's designed to work with standard foam concentrate dispensing tools.

SoyFoam is relatively new, having been in commercial use for just about a year, but it's already in use in roughly 150 fire departments across the Midwest.

"Firefighters and volunteers like it because they're using their own products, and they know it won't make them sick or give them cancer," Garlie says. "It makes the decision to use foam or not much easier, as they're not adding harm or a catastrophic event to the fire scene. It's a feel-good story, and it works great."

Manufactured in Georgia, Cross Plains Solutions aims to add future manufacturing and crushing facilities near soybean farming areas.

"One thing we're very proud of is that we were nominated for the Presidential Green Chemistry Challenge Award, and we won. Through our efforts with SoyFoam, we're doing our part to regain and build community confidence in chemistry through agriculture," Garlie says.

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Shop-Made Corn Stripper Wows Customers

Pat Mitchell of Templeton, Calif., builds and sells a custom-designed corn stripper that uses compressed air to efficiently process 6 to 10 ears of corn—raw or blanched—per minute.

"After years of struggling to cut sweet corn off the cob, I thought there just had to be a better way," Mitchell says. "So, in the winter of 2021, I went into my farm shop to work on a machine that would do the work and spare me sore hands, arms and wrists."

Mitchell's initial challenge was figuring out a power source.

"Would it be electric, hydraulic or pneumatic? I concluded that pneumatics, using a pneumatic cylinder, would be quickest and cleanest."

Next, he considered whether the machine should operate on a vertical or horizontal axis.

"I chose vertical so that the machine could stand on its own and not be dependent on a table, or even worse, a table with a hole cut in it. This also makes the machine extremely portable and easy to use."

He also needed to make sure it was possible to control the air cylinder's speed to achieve high-quality cuts.

"I incorporated a directional control valve to accomplish this. The machine's built to operate at eye level while you're comfortably seated."

Mitchell tested several cutters before selecting thin, stainless-steel ones that minimize damage to the kernels during removal.

"I had to commission a special pan that captures the corn while fitting my design."

The result is a durable, farm-built machine with welded steel construction that's ready to use straight out of the box. All that's needed is a small amount of compressed air at 80 psi.

"There were no other machines out there at the time," Mitchell says. "All machines since are copycat versions of my machine. I have

the only patented machine on the market."

Mitchell currently holds more than 30 patents in the fields of food, beverage and machinery.

The Corn Stripper costs $342, plus $55 for shipping. Each purchase includes The Corn Stripper, a corn collection pan, two standard cutters, one large cutter, tongs and a quick-connect air fitting.

Although Mitchell has mastered the process, making The Corn Stripper requires a significant amount of time.

"From the time we start with bare metal in the shop until a machine is ready to ship out our shop door, it's a four to five-week cycle," he says. "We've had a very happy customer base over the last four seasons."

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Algorithms analyze digital images to detect pests, diseases and hot spots in vegetation.

Cameras Scout For Greenhouse Problems

Croptimus from Fermata is an AI-powered system for crop scouting. It uses affordable cameras that rotate 360 degrees to continuously monitor crops. Computer vision technology uses artificial intelligence to detect and identify pests, fungal diseases, viruses and mechanical damage.

Croptimus identifies current issues and uses an augmented reality overlay to show growers exactly where in the canopy the problem has been found. It also provides a comprehensive case management system to

track the crop and treatments over time.

"We developed a computer vision system that we want to bring to every farm on the planet to help produce healthier and better crops," says Dr. Valeria Kogan, Fermata co-founder and CEO.

The Israeli company entered the Canadian market and other markets in 2022 through direct sales and third-party distribution. Currently focusing on greenhouses, the company sees future open-field applications involving robots and aerial drones.

The company partnered with fellow Israeli company agRE.tech, maker of solar-powered robots. The collaboration tested Croptimus in open-field situations. Because Croptimus uses a 360-degree camera rotation, a single camera per robot is enough to monitor crops. agRE.tech's robots are designed to respond in real time to treat the identified problems with chemical or biological controls.

Kogan has identified three main issues faced by farmers. These include managing pests and disease outbreaks, production and manual scouting costs, and time delays. Croptimus was designed to address all three with its combination of cameras and AI.

The collected images are uploaded to the cloud, where the AI is activated. Algorithms analyze digital images to identify pests, diseases and hot spots in the vegetation. Incident icons, which signal problems, are overlaid on the crop image. When potential issues are detected, a notification is sent to the grower or team member.

The grower or team member can access a 360-degree view of the crop and click and drag an icon to explore details. If they take actions to address the problem, Croptimus continues monitoring to evaluate effectiveness.

The AI program's effectiveness depends on

thousands of images of real-world pest and disease infestations. The company's strategy was to place cameras in greenhouses, validate data through grower feedback, and continuously repeat the process. As the program is used more, it becomes smarter. The company has also set up lab-induced infestations to gather even more images under controlled conditions.

Kogan describes Croptimus as designed to be flexible, adapting to new pests, different geographies, and new growers as it's used. The next steps for the AI crop scout include adding crop registration and pollination tracking. In the future, she expects climate and irrigation data to be incorporated into the system.

The company claims that Croptimus will reduce scouting by 50%, crop loss by 30%, and input costs by 25%. In 2025, its focus was on tomato production in Canada and the Netherlands. Future crop targets include cucumbers and peppers, followed by strawberries and grapes, with more crops planned later.

The company did not respond to pricing requests.

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