

# What happens to fire retardant-soaked crops?

By Julie Cart, CALmatters

The full extent of the damage from the northern California wildfires that killed 43 people and destroyed 8,400 homes is still being tallied. The devastation left an obvious scar, but not all the damage is visible.

Among the assessments still to be made is what impact millions of gallons of fire retardant—essentially a potent fertilizer—may have on carefully tended plants and soils.

Saved by timing, nearly 80 percent of the renowned wine region's grapes had been harvested when the multiple fires started in early October. And for the most part, the blazes did not linger at the vineyards, which are kept free of grasses and other fire-devouring fuels.

But there was collateral damage: bright red slathers of fire retardant dropped from the state's fleet of supertankers. In one week, more than 2 million gallons of retardant were dropped in California—a record, according to Cal Fire, the state firefighting agency.

"We are always mindful of where we are trying to drop aerial fire retardant," said Chris Jurasek, the CalFire aviation supervisor who directed many of the drops. "It's always in our mind to try and alleviate contacting anything other than fire."

CalFire has the largest aerial firefighting fleet in the world. As planes become increasingly central to fighting fires in California, more and more retardant is served up.

On one day during the recent fires, Oct. 12, crews loaded

nearly 700 gallons of retardant a minute from dawn to dusk to help slow the fire, according to CalFire.

By way of comparison: The state's largest aviation facility, near Sacramento, pumped 1.7 million gallons of retardant into firefighting tankers in 2016. The base has already used more than 4 million gallons so far this year.

The retardant, called Phos-Chek, contains ammonium phosphate, a fertilizer. It also includes chemicals to regulate how the slurry drops, emulsifiers that render it gooey so it sticks to targets, and a coloring agent so air crews can track what they've dropped. For the most part, the ingredients are disclosed to CalFire by the Phos-Chek manufacturer, ICL-Performance Products, LP.

But the entire formula is not made public. George Matousek, an ICL chemist who helped formulate the retardant, said the precise recipe is a trade secret but "all products in Phos-Chek are food-grade or better."

The chemicals are mixed with water and are generally harmless to humans and most animals, according to the company. But retardants are known to be toxic to fish, so state and national fire-fighting agencies prohibit drops within 300 feet of water sources.

But as Western wildfires increasingly move out of forests and into developed areas, firefighters have less wiggle room to target their drops.

When a converted 747 jetliner is lining up to release nearly 20,000 gallons of retardant, there's no guarantee of precision. Pilots are often guided away from water sources and landscapes containing plants that are endangered or otherwise protected by law, using retardant avoidance maps published by the U.S. Forest Service.

It's an issue that's taken seriously by fire-fighting

agencies. Biologists say that a sudden dump of nutrients in soils can encourage the growth of non-native or invasive plants.

“There is a precedent for concern about soil chemistry,” said Andy Stahl, executive director of Forest Service Employees for Environmental Ethics, a watchdog group made up of Forest Service employees and others.

Improving soil productivity “would allow invasive plants that are better able to utilize these nutrients (to) crowd out natives.” How those interactions might play out in carefully curated vineyards is not known. Winemakers are famously fussy about soil: It’s what imparts the terroir that gives wines their unique characteristics.

Some vintners choose not to use fertilizers of any kind.

“A lot of time and effort is put into that soil,” said Andrew Walker, a geneticist at the University of California, Davis’ Department of Viticulture and Enology, which is devoted to all things wine-making. Fertilizers may be altogether undesirable, he said.

North Coast vintners “make expensive wines. They work on quality rather than quantity. They don’t necessarily want excessive vine growth.”

Walker said not much is known about potential effects of retardants on commercial crops. Previous blazes have raced out of wildlands and into agricultural lands, destroying fruit and nut orchards, hay fields and, increasingly, California’s highly lucrative cannabis plantations. Farmers of such crops have specific guidelines for fertilizing their plants.

Academics and researchers are beginning to study the issue—a good thing, Matousek said. “It’s something that’s going to come up more often.” The Napa County Agricultural Commissioner did not return phone calls for comment.

The Wine Institute, an advocacy group for 1,000 wineries and business in California, declined to comment. A representative of a regional cannabis-growing association did not respond to a request for comment.

But the Napa County Health and Human Services Agency posted an online warning earlier this month. It stated that although there is little danger in ingesting produce when retardant is present, it's to be avoided.

"Individuals are advised against consuming fruits and vegetables from home gardens to which retardant may have been applied, or from areas in wildlands where residues are visible," the agency said.

"In addition to avoiding consuming food items with visible residues, the fertilizer component of the retardants may lead to temporary increases in the nitrate content of soils in areas of application." Walker said plants take in chemicals in soils, but they also can absorb some chemicals to no ill effect.

Still, Dennis Hulbert, a retired regional aviation manager for the U.S. Forest Service who oversaw firefighting action in California, said retardants are relied upon too much by overwhelmed fire managers.

Hulbert said he spent 39 years ordering retardant drops without knowing much about the potential long-term implications. "This is 50-year-old technology," he said. "I'm not sure it's a good thing."

Cal Fire's Jurasek, for his part, said the tankers and their loads of retardant were instrumental in quenching the recent fires. The wineries will recover, he said. As for the possibility of lingering problems in soils and plants, he said, "I do not have any concerns."

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