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Fighting Fire...With Pollutants

In 1999, more than 27 million gallons of fire-retardants were dropped on forest fires in the US. The figure for the 2000 fire season will easily top that. But just what is in those red-tinted sprays?

An *Earth Island Journal* investigation reveals that the chemicals in retardants and foam can damage plants, disrupt ecosystems, and poison fish and small mammals.

There are two basic types of fire-fighting sprays – retardants and foams. The biggest suppliers are Ansul, Chemionics, and Monsanto. The most common retardants are variations of Phos-Chek (Monsanto) and FireTrol (Chemionics). Common foams include Phos-Chek WD-881 (Monsanto), Silv-Ex (Ansul), and Fire Quench (the Texas Department of Corrections).

Retardants are basically 80 percent water, ten percent fertilizer, and ten percent chemical additives. Ingredients include ammonium phosphate (a common fertilizer), ammonium sulfate, hexylene glycol, butyl carbitol, ethyl alcohol, iron oxide, butanol, ethanol, anionic surfactants, guar gum, spoilage inhibitors, gum-thickeners, and bactericides.

A report by the School of Ecology and Environment at Australia's Deakin University notes that fire retardants "have been of concern since the 1970s [due to]... weed invasion and reduced species diversity.... caused by additions of nitrogen and phosphorus to soils naturally low in these nutrients."

The Australian researchers reported that the use of ammonium sulfate retardant in New South Wales caused "leaf death within a week of treatment, which continued for many months" and that "decreases in cover were... recorded one year after treatment for 19 of 46 species."

At temperatures above 200°F (93°C), Phos-Chek 259F retardant breaks down into toxic ammonia and phosphoric acid. Fire-Trol LCA-F releases ammonia and sodium cyanide as "hazardous decomposition products." ForExpan S (Angus FireArmour Ltd.) leaves behind toxic amounts of sulfur and nitrogen oxides. Fire Quench produces hazardous sulfur oxides as

decomposition products. Only one foam suppressant – Pyrocap – received good marks from researchers.

A study published in *Environmental Toxicology and Chemistry* cautions that "entry of fire-fighting chemicals into aquatic environments could adversely affect aquatic invertebrates, and disrupt ecosystem functions." A 1996 National Interagency Fire Center study by Labat-Anderson Inc. found long-term retardants posed risks to blue jays, wild turkeys, and rabbits.

Studies conducted at the US government's Northern Prairie Science Center (NPSC) in North Dakota found that the chemicals in retardant and foam were "very toxic to aquatic organisms including algae, aquatic invertebrates and fish." The NPSC studies observed "lower stem density" on plots treated with Silv-Ex and reduced "species richness" due to the "addition of nitrogen to the soils."

The NPSC warned that spills of fire-fighting chemicals could "cause substantial fish kills..., thus disrupting ecosystem function."

A study in the *Journal of Range Management* found that the biomass of a burned grasslands in southern California doubled after spraying with phosphate retardants. Unfortunately, native legumes "failed to establish on retardant-treated areas" and were replaced by nitrogen-tolerant invasive weeds.

The North Dakota tests found that Silv-Ex damaged roots of snowberry, suppressed flowering in pink swamp-heath, and triggered "periods of stupor and lack of co-ordination.... in exposed kestrels, and some mortality of Red-winged blackbirds." Monsanto's Phos-Chek WD-881 and Silv-Ex foams "were ten times more toxic for Rainbow trout and Chinook salmon, and between 10-258 times more toxic for Fathead minnow, than the [other] fire retardants tested."

A 1989 Department of Agriculture study estimated that "a one percent field application of Silv-Ex would need to be diluted up to 50,000 times to reach safe concentrations" and warned that "toxic levels are likely to persist for some time in static water bodies." Accidental applications and spills of fire retardants into streams have been implicated in fish kills.

Ecosystems have adapted to survive – and benefit from – wildfires. If climate change continues to spark large fires, the Earth's forests and fields may find it harder to recover from an increasing deluge of man-made chemicals. – GS