

Steven Lasee, MS PhD

PFAS contamination expert

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# Targeted analysis and Total Oxidizable Precursor assay of several insecticides for PFAS

Steven Lasee<sup>a,\*</sup>,<sup>1</sup> Kaylin McDermett<sup>a</sup>, Naveen Kumar<sup>a</sup>, Jennifer Guelfo<sup>a</sup>, Paxton Payton<sup>b</sup>,  
Zhao Yang<sup>a</sup>, Todd A. Anderson<sup>a</sup>

<sup>a</sup> Texas Tech University, 2500 Broadway, Lubbock, TX 79409, the United States of America

<sup>b</sup> Cropping Systems Research Laboratory, US Department of Agriculture, 3810 4th Street, Lubbock, TX 79401, the United States of America

### ARTICLE INFO

### ABSTRACT

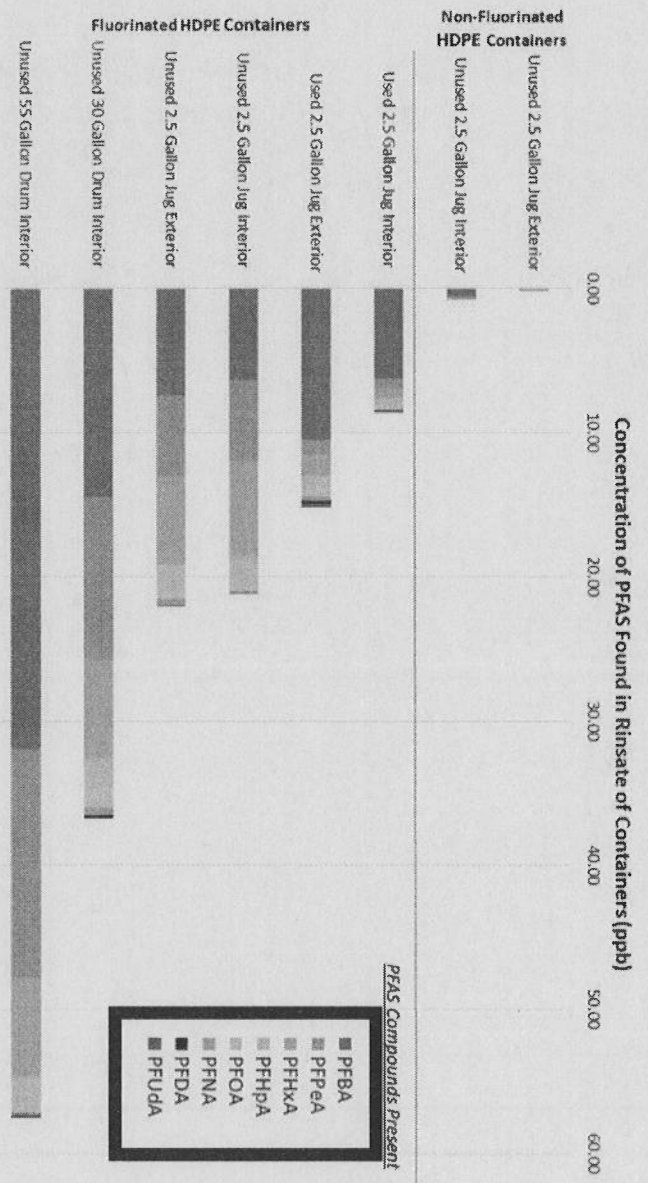
Targeted analysis for 24 Per- and Polyfluoroalkyl Substances (PFAS) was conducted on 10 insecticide formulations used on a United States Department of Agriculture crop research field. Perfluorooctane sulfonic acid (PFOS) was found in 6 of the 10 formulations with concentrations ranging from 3.92 to 19.2 mg/kg. Further analysis of soil and plant samples collected at the site found several additional PFAS, with PFOS being the most prominent. Suspect screening was then conducted on the formulations and provided several suspected PFAS in addition to the 24 targeted analyzed PFAS in 7 of the 10 samples, one of which showed no PFAS during targeted analysis. PFAS-precursor oxidation was then conducted on the two insecticide formulations with the greatest lists of suspected PFAS as validation of potential unknown PFAS in the formulations. This study revealed a previously unknown potential PFAS contamination source for rural and agricultural environments.

### Keywords:

PFAS  
PFOS  
Insecticides  
Exposure  
Agriculture

# EPAs study of containers

Figure 1 - Levels of PFAS in rinsates from containers



This results in a concentration of around 250 ppt PFOA in the insecticide

# Findings of Lasee et al.

**Table 1**  
Average concentration of PFOS in the analyzed insecticide formulations (mg PFAS/kg formulation or ppm,  $\pm$  standard deviation). The concentrations reported were calculated from the dilution described previously in the "Insecticide Analysis section". PFAS with no concentrations above LOQ were not included in this table.

Sample ID	Formulation type	Active ingredient	PFOS (mg/kg)
1	Liquid concentrate Emulsified suspension	Abamectin	3.92 $\pm$ 0.51
2	Liquid concentrate Emulsified suspension	Novaluron	9.18 $\pm$ 0.34
3	Liquid concentrate Emulsified suspension	Mineral Oil (Petroleum oil)	8.64 $\pm$ 0.67
4	Liquid concentrate Emulsified suspension	Imidacloprid	13.3 $\pm$ 1.4
5	Liquid concentrate Emulsified suspension	Spiromesifen	19.2 $\pm$ 1.2
6	Liquid concentrate Emulsified suspension	Malathion	17.8 $\pm$ 0.7
7	Wettable powder	<i>Beauveria Bassiana</i>	0
8	Wettable powder	Pyridalyi	0
9	Emulsified suspension	Spinosad	0
10	Wettable powder	Spinetoram, Sulfoxaflor	0
BLANK			0