

May Update from the Field 2023: Chemical and pesticide storage

Environmental Endocrine-Disrupting Chemical Exposure: Role in Non-Communicable Diseases

Kumar, M., Sarma, D. K., Shubham, S., Kumawat, M., Verma, V., Prakash, A., & Tiwari, R. (2020). Environmental Endocrine-Disrupting Chemical Exposure: Role in Non-Communicable Diseases. *Frontiers in public health*, 8, 553850. <https://doi.org/10.3389/fpubh.2020.553850>

The exponential growth of pollutant discharges into the environment due to increasing industrial and agricultural activities is a rising threat for human health and a biggest concern for environmental health globally. Several synthetic chemicals, categorized as potential environmental endocrine-disrupting chemicals (EDCs), are evident to affect the health of not only livestock and wildlife but also humankind. In recent years, human exposure to environmental EDCs has received increased awareness due to their association with altered human health as documented by several epidemiological and experimental studies. EDCs are associated with deleterious effects on male and female reproductive health; causes diabetes, obesity, metabolic disorders, thyroid homeostasis and increase the risk of hormone-sensitive cancers. Sewage effluents are a major source of several EDCs, which eventually reach large water bodies and potentially contaminate the drinking water supply. Similarly, water storage material such as different types of plastics also leaches out EDCs in drinking Water. Domestic wastewater containing pharmaceutical ingredients, metals, pesticides and personal care product additives also influences endocrine activity. These EDCs act via various receptors through a variety of known and unknown mechanisms including epigenetic modification. They differ from classic toxins in several ways such as low-dose effect, non-monotonic dose and trans-generational effects. This review aims to highlight the hidden burden of EDCs on human health and discusses the non-classical toxic properties of EDCs in an attempt to understand the magnitude of the exposome on human health. Present data on the environmental EDCs advocate that there may be associations between human exposure to EDCs and several undesirable health outcomes that warrants further human bio-monitoring of EDCs.

An optimized LC-MS/MS workflow for evaluating storage stability of fluroxypyr and halosulfuron-methyl in maize samples

Ying, Y., Cao, Z., Li, H., He, J., Zheng, L., Jin, M., & Wang, J. (2021). An optimized LC-MS/MS workflow for evaluating storage stability of fluroxypyr and halosulfuron-methyl in maize samples. *Journal of environmental science and health. Part. B, Pesticides, food contaminants, and agricultural wastes*, 56(1), 64–72. <https://doi.org/10.1080/03601234.2020.1838826>

Pesticide registration ensures the safety of agricultural products; however, the backlog of field samples often requires lengthy storage periods. Thus, the stability of pesticide residues in stored samples is required information for pesticide registration. We monitored the degradation rates of fluroxypyr and halosulfuron-methyl in maize straw, mature maize grain, and fresh corn matrices to evaluate their storage stability. Analytes were extracted and cleaned up with a modified Quick, Easy, Cheap, Effective, Rugged, and Safe (QuEChERS) method and then detected with liquid chromatography tandem-mass spectrometry. We optimized the workflow by testing different clean-up sorbents, LC columns, and chromatographic methods. The linearity correlation coefficients of fluroxypyr and halosulfuron-methyl in the three matrices were ≥ 0.994 . At three fortification levels, the mean recoveries of fluroxypyr and

halosulfuron-methyl were 84.2-114.8% and 83.8-105.5% with relative standard deviations of 2.4-9.4% and 2.7-10.2%, respectively. Degradation of the two herbicides in the three matrices was less than 30% over the 70-day storage period, indicating fluroxypyr and halosulfuron-methyl are stable in the tested maize matrices when stored at -20 °C for at least 70 days. This study provides a reference method for pesticide residue analysis and can be used as a guide to develop accurate and reasonable pesticide registration procedures.

Bridging Safety Language Disparities in Orchards: A Pesticide Label Mobile App

Galvin, K., Kasner, E., Cruz, I., & Palmández, P. (2021). Bridging Safety Language Disparities in Orchards: A Pesticide Label Mobile App. *Journal of agromedicine*, 26(1), 6–14.

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Objectives: The goal of this project was to determine if a mobile application displaying pesticide label information in Spanish and English was a viable approach to addressing safety and health disparities for orchard workers. This study assessed pesticide label use patterns in orchards; application user experience; and the potential of modern information systems to deliver bilingual content. **Methods:** Pesticide handlers and orchard managers were asked to use a mobile application prototype for a period of one month in 2016. A convenience sample of ten participants completed a 36-question interview to share their experiences. The research team summarized interview responses with summary statistics and grouped content analysis.

Results: Mean participant (n=10) age was 49. Eight were Latinx and spoke Spanish as their primary language. Six used the app frequently (15 times), one used it sometimes (6 - 10 times), and three used it rarely or occasionally (1 - 5 times). All participants viewed sections about product information and personal protective equipment. Most viewed information related to emergency and first aid, hazards, and storage and disposal. Overall user experience was positive, with an emphasis on the importance of access to label information in Spanish.

Conclusion: The overwhelming majority of the Pacific Northwest agricultural workforce is Spanish-speaking, despite critical pesticide safety information being provided on lengthy product label documents in technical English. This project demonstrated that the mobile application seems to be a viable approach to reducing language disparities and improving Latinx orchard worker safety.