



# CULTIVATING SAFETY

# SAFEGUARDING AGAINST THE LONG-TERM EFFECTS OF AGRICULTURAL CHEMICAL EXPOSURE



Some workplace environments inherently expose workers to a greater number of safety risks than others. So too, some hazard types straddle multiple industry sectors, putting workers at risk purely through the intrinsic characteristics of the hazard itself. One such example is the wide-ranging threat from exposure to agrichemicals which, despite the name, are not limited to farming or pure agriculture environments.

An umbrella term, the word 'agricultural chemicals' encompasses a diverse range of substances that are available in many concentrations and forms including liquids, powders, granules and pellets. These chemicals can be relatively general in nature (like fuels and solvents) or have a very specific purpose. Some aim to improve or control growing conditions and processes (soil desiccants and harvest aids), whereas others are designed to kill or minimise crop or livestock threats including animal pests, weeds and insects. These are defined in the following broad groups, including some common examples of each:

- Pesticides** pyrethroids, sodium fluoroacetate, zinc phosphide and strychnine;
- Herbicides** glyphosate, paraquat and diquat;
- Insecticides** organophosphates and neonicotinoids;
- Fungicides** calcium polysulfide, captafol and captan and;
- Fumigants** methyl bromide

The relative efficacy of agricultural chemicals is a double-edged sword — the same characteristics that ensure effectiveness in the eradication of pests also pose a significant threat to human health if suitable precautions to limit exposure are not implemented.

# EVERYDAY EXPOSURE

Exposure to these chemicals can occur in many ways. Obvious scenarios include treatment of animals, crops, plants and grain stores in agricultural or livestock production settings, but other known risk environments include forestry, gardening, professional (or domestic) pest control, or exposure through the spraying of public parks, pavements and playgrounds. Any process that employs fumigation for parasite management, such as cross-border biosecurity, also leaves workers open to exposure.

Workers in industries away from the land are also at risk from these chemical types, including those carrying out the application of substances to preserve timber or marine drydock workers employing treatments on boat hulls and decks.

Ingress of these highly toxic substances into the body is via the skin (dermal contact), lungs (inhalation) or the gastrointestinal tract (ingestion) and the seriousness of effects varies according to the chemical properties of the substance, as well as level and length of exposure.

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# SHORT-TERM EFFECTS

Symptoms of detrimental short-term exposure will generally appear within 48 hours and can present in a variety of ways;

- Respiratory tract inflammation, causing a sore throat and/or cough
- Allergic sensitisation
- Eye and skin irritation
- Nausea, vomiting and diarrhoea
- Headache, dizziness
- Extreme weakness
- Loss of consciousness
- Seizures
- In extreme cases, symptoms can include irregular heartbeat or abdominal pain and can even lead to fatality

# LONG-TERM EFFECTS

**Less is known about long-term effects, though some studies have linked even low levels of toxicity acquired through repeated or continuous contact with the development of a frightening array of conditions. These may include everything from nervous system disorders (such as Parkinson's disease), through to cancers (including leukaemia and non-Hodgkin lymphoma), chronic lung conditions (like asthma) and immune or endocrine system disruptions. Some studies also suggest exposure can contribute to mental health conditions including anxiety and depression, as well as attention deficit and hyperactivity disorder (ADHD).**

A recent research program developed by Australia's Deakin University aims to better understand the effects of long term agrichemical exposure via a longitudinal study of farmers. Specifically, the research project measures the cholinesterase enzyme levels in farmers at monthly intervals over the duration of one year, allowing for seasonal fluctuations in the use of some chemical types.

Cholinesterase enzymes are responsible for nervous system health, as they prevent the accumulation of acetylcholine (a neurotransmitter) and the overstimulation of muscles and nerves this build-up creates. Exposure to certain pesticides had been thought to lower cholinesterase levels but an historic lack of protracted data has made it difficult to ascertain a clear link between cumulative exposure and negative health implications.

Preliminary data drawn from the Deakin study indicates that cholinesterase enzymes are markedly lower in individuals with high exposure to organophosphate pesticides. While organophosphates are banned outright in the United States and restricted in the United Kingdom and EU, they are deemed an essential part of sheep, beef, grain and dairy production in Australia, due to a prevalence of pests that can only be eradicated through organophosphate use.

# WHY 'NO EXPOSURE' IS IMPOSSIBLE

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To truly remove all risk to human health, highly toxic agrichemical substances would need to be completely outlawed. As with many workplace safety hazards, complete elimination is an unachievable goal, so a program of harm minimisation based on rigorous assessment must be implemented. This is something recognised by the World Health Organization (WHO) which sees “good management, use and disposal of agrochemicals – particularly pesticides – as an important health and environment issue”.

When conducting a workplace hazard assessment, it's important to consider scenarios where multiple substances are found, as the effect of an individual chemical can be enhanced or significantly changed when combined with another. Given the current lack of verifiable long-term data, exposure to a cocktail of chemicals can potentially present an even more harmful outcome than that of a single substance alone.

It is imperative to read and understand the (legally required) Material Safety Data Sheet (MSDS) information and product labelling supplied with any hazardous material to ensure its safe storage, handling, use and disposal.

# PROTECT YOURSELF WITH PPE

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**Utilising appropriate personal protective equipment (PPE) is the best defence against workplace agricultural chemicals exposure hazards.**

PPE options in these applications can include gloves, clothing, boots, cuffs, face shields, aprons and eye protection including goggles and glasses. While the nature of the risk will largely determine the form of required PPE, adequate chemical protection calls for a detailed understanding of the substances to which workers are exposed. Protective clothing and gloves are manufactured in a wide range of styles and materials which mean they are more-or less-suited to specific applications. For example, some material types will be susceptible to failure by degradation or to permeation of certain chemical types, particularly when combined with other environmental factors such as ambient temperature.

Utilising a service such as Ansell's Chemical Guardian can help clarify selection and deliver optimal safety for workers. Through a personalized assessment, along with recommended permeation times, safety and operations managers can be assured that only the most suitable PPE for the environment is identified, eliminating the likelihood of inappropriate selection and delivering long-term safety and savings



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