

## **CROPLIFE SOUTH AFRICA POSITION STATEMENT**

### **HISTORY AND SCIENTIFIC FACTS: 2,4-D IN SOUTH AFRICA AND ABROAD**

**1 APRIL 2014**

#### **HISTORY**

The herbicide 2,4-D is a chlorophenoxyacetic acid that was discovered in 1942 by P.W. Zimmerman and A.E. Hitchcock<sup>1</sup>. It is a synthetic auxin that acts like indole acetic acid (IAA) and is selective for broad-leaved weed control in agriculture and horticulture. 2,4-D derivatives are readily absorbed by foliage of broad-leaved plants and moderately absorbed by the roots. This herbicide has seen wide application in maize and sugar cane production while other crops such as stone fruit and citrus have also enjoyed the benefits of 2,4-D as a selective broad-leaved herbicide. It is the second most widely used herbicide in the world and has been used in South Africa for more than 40 years. It is currently authorized for use in more than 80 countries.

#### **CONCLUSIONS ON HUMAN SAFETY**

CropLife South Africa concurs with the findings of the US EPA, the European Commission and the Canadian Pest Management Regulatory Authority (PMRA) that there is no reason to believe that 2,4-D is linked to cancer or any other clinical conditions. There is no proof of any clinical condition in farmers or farm workers that have been using 2,4-D containing herbicides in South Africa for over 40 years.

In Canada, the PMRA announced its conclusion in 2008 – following extensive scientific review coupled with the independent evaluations of a science advisory panel composed of health experts and researchers in government and university settings – that “2,4-D does not increase the risk of cancer and can be used safely by homeowners, provided label directions are followed.”<sup>2</sup> The PMRA noted in announcing its findings that its review had used the most current scientific methods and had given special attention to potential exposures to children.

In 2012, following an additional review, EPA rejected an activist petition calling for cancellation of all 2,4-D tolerances and labeled uses. In its response, EPA reaffirmed the acceptability of current 2,4-D uses and specifically responded to each of the health-based claims on which the rejected petition was based. EPA concluded that currently authorized uses of 2,4-D provide a “reasonable certainty of no harm,”<sup>3</sup> which is the Agency’s regulatory standard for the protection of human health.

## **Findings relating to Human Carcinogenicity**

Despite claims to the effect that 2,4-D is linked to cancer and specifically to Non-Hodgkin's Lymphoma (NHL) there is overwhelming evidence to the contrary. Initial studies conducted 30 years ago in the United States of America suggested that 2,4-D could be linked to NHL. Many of the same authors have now concluded that there is no association between 2,4-D exposure and NHL. These authors wrote (quote): *"Much attention in NHL [non-Hodgkin's lymphoma] has focused on 2,4-D as a potential risk factor, and several studies have observed positive associations with 2,4-D exposure. Whereas an indicated effect of 2,4-D exposure on NHL was reported in the NCI's [National Cancer Institute's] Nebraska and Kansas studies, this analysis of the pooled data found no association with ever having used 2,4-D. The null association is due to pooling data from the Iowa and Minnesota study, in which no association of 2,4-D with NHL incidence was observed, with data from the Nebraska and Kansas studies. The literature on the relation between 2,4-D and NHL is not consistent."*<sup>4</sup>

A science advisory panel convened by the US Environmental Protection Agency (EPA) to review all the studies on 2,4-D and Non-Hodgkin's Lymphoma reported in 1994 that (quote): *"Some case-control studies have shown a risk of NHL in association with the occupation of farming, but many did not indicate whether this relationship was due to a specific exposure to 2,4-D... Thus the studies cannot distinguish whether any observed risks reported in these studies are due to the use of 2,4-D or some other aspect of farming as an occupation."*<sup>5</sup>

The EPA recently reiterated its position on these farm worker studies in subsequent reviews. The detailed conclusions of EPA and its science advisory panel – and the data behind those conclusions – have been openly reported and are readily available in reports open to public scrutiny.

EPA concluded in 2005 that labeled uses of 2,4-D did not pose risks of regulatory concern after a 17-year review that evaluated all potential 2,4-D exposures<sup>6</sup>. This EPA review included consideration of human and animal studies and exposures from food residues, drinking water and residential applications. The conclusions reached by this EPA review are similar to those reported by other regulatory authorities. In 2007, these EPA findings were again reconfirmed<sup>7</sup>.

## **Motor neuron disease**

A suggested link between 2,4-D exposure and motor neuron disease is not backed by any scientific or clinical studies. This allegation was based on the assumption that rugby players are exposed to 2,4-D on sport fields. This assumption has no scientific basis as the herbicide is hardly ever used on such sport fields.

## **Other clinical conditions**

A further attempt to link a water sportman's clinical condition to 2,4-D is also speculative at best. No exposure data was presented. The natural water bodies of South Africa are severely compromised by pollutants of inorganic, organic and pathogenic nature. It would be highly unlikely that traces of 2,4-D in such waters could have induced the person's clinical condition especially in view of the array of pollutants that are present in South Africa's fresh water bodies.

## **Other references to 2,4-D**

There is often reference to Agent Orange, a herbicide used in Vietnam that consisted of 2,4-D, 2,4,5-T, diesel fuel and kerosene to defoliate forest landscapes. Agent Orange contained a dioxin contaminant found in 2,4,5-T as a trace impurity that has been alleged to have developmental, reproductive, immune, hormonal and cancer risks for people. 2,4,5-T was phased out of use long ago as a result of dioxin concerns. 2,4-D was not the product of concern in Agent Orange. Current 2,4-D products have been extensively evaluated and have been found by government and international authorities to meet strict standards for the protection of health, safety and the environment.

## **Acute oral and dermal toxicity**

The toxicology of 2,4-D is well documented in each of the regulatory decisions cited above. The parent compound (2,4-D) is the most toxic of all the available derivatives with a mammalian LD<sub>50</sub> of 639 mg/kg body mass while the sodium salt has an LD<sub>50</sub> value of more than 2,025 mg/kg body mass. Other derivatives including various salts and esters are far less toxic. Avian toxicity ranges from LD<sub>50</sub> of 398 mg/kg for 2,4-D isopropylamine salt to LD<sub>50</sub> of >5,620 mg/kg body mass for the 2,4-D-2 ethylhexyl ester derivative. Esters are toxic to fish with LC<sub>50</sub> of 0.62 mg/l (96 hours) while the parent compound 2,4-D has a LC<sub>50</sub> value of more than 100 mg/l (96 hours) for fish which is considered to be of insignificant toxicity. Toxicity to bees is not significant with most of the derivatives having contact and oral LD<sub>50</sub> values of around 100 microgram per bee.

## **2,4-D IN THE TALA VALLEY IN KWAZULU-NATAL**

### **Allegations against 2,4-D in the Tala Valley**

Vegetable farmers and academics in KwaZulu-Natal's Tala Valley launched a campaign in 1986 against the use of 2,4-D herbicides based on their assumption that the aerial application thereof in sugarcane damaged vegetable crops in the valley. The assumption was also made that all 2,4-D herbicides of all formulations are volatile and could cause drift with resultant impacts on surrounding susceptible broad-leaved crops. It was also alleged that the herbicide caused birth defects in the local population.

These allegations prompted investigations by the then Departments of Agriculture and Health. The Health Department did extensive surveys at hospitals in the sugarcane producing areas of KwaZulu-Natal where 2,4-D was used and also in the Western Cape where no 2,4-D was used – the latter region was selected as a control group to test the hypothesis that 2,4-D caused birth defects. Not surprisingly, the study showed no difference in the incidences of birth defects between the KZN sugar cane (2,4-D) and Western Cape (no 2,4-D) areas. It was thus scientifically concluded that the allegations of 2,4-D being responsible for birth defects were false.

### **Investigations into 2,4-D human health and plant health effects**

The Department of Agriculture appointed an advisory committee consisting of departmental officials, University of Natal, the Agriculture Research Council (ARC), AVCASA (the Association of Veterinary and Crop Associations of South Africa) and the Fresh Produce Grower's Association to investigate the matter. A pesticide residue survey was conducted by the ARC to test the hypothesis that there was 2,4-D in the atmosphere and rainwater in the Tala Valley due to application thereof in sugarcane. Apart from one reading that was very high due to the sampling unit being spiked with 2,4-D by an individual from a

university, the air and rain samples had very little or no 2,4-D in them. These results showed that the hypothesis of a major 2,4-D aerial and rain water contamination in the Tala Valley was false.

A research study conducted in controlled conditions in a glasshouse that emulated the cold front conditions that prevailed on one of the vegetable farms proved that those cold front conditions produced deformation of vegetable crops identical to expected 2,4-D effects on such crops. It was also discovered during discussions with vegetable producers that some of them used raw chicken litter in the vegetable crops. The effects of this unmeasured and uncontrolled nutrient was not tested thus casting doubt over the alleged effects of 2,4-D. It was concluded that 2,4-D was not necessarily the reason for vegetable crop deformation especially in view of the cold front conditions and raw chicken litter used as soil nutrient.

### **Restrictions placed on the use of 2,4-D in KwaZulu-Natal and for aerial application**

Despite these research findings, the Department of Agriculture imposed precautionary restrictions on the use of 2,4-D in 1991. 2,4-D derivatives may not be applied by aerial application in KwaZulu-Natal and the use of volatile 2,4-D esters is prohibited in KwaZulu-Natal.

### **Changes in agricultural production in the Tala Valley**

The change in agricultural production from predominantly vegetables to sugarcane in the Tala Valley of KwaZulu-Natal is purely economical as sugarcane farming is simply more profitable than vegetable farming. The changes did not come about as a result of the 2,4-D episode some 28 years ago. 2,4-D has in fact not been used in the Tala Valley since 1992 due to the restrictions imposed by the Department of Agriculture.

### **Safety of 2,4-D as a herbicide used in agriculture and horticulture**

As stated earlier on in this document the allegation that 2,4-D is a carcinogen (cancer causing agent) is not proven and nothing but speculation. There are no cases that have ever scientifically linked 2,4-D to cancer, neither in South Africa nor abroad. The survey conducted by the Department of Health during the Tala Valley 2,4-D saga also proved that there is no reason to believe that the molecule is a teratogen (developmental toxin). No other studies in the world established a link between 2,4-D and birth defects.

CropLife South Africa therefore wishes to assure South Africans that 2,4-D holds no undue risk for people if herbicides that contain this active ingredient are used according to label instructions.

### **Registration of pesticides in South Africa**

All pesticides that are used legally in South Africa have to be registered under the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947). This is a rigorous process that includes the evaluation of human and environmental toxicological data, efficacy data and a large volume of other data to ensure that pesticides that are registered are in the public interest and pose no unnecessary risk to people and the environment when used according to label instructions. South Africa's criteria for registration match those of countries in the northern hemisphere and much of the data that are used for local registration applications have already been used in successful registrations in the European Union, Asia, South America and North America.

## For further information please contact:

Mr Tom Mabesa, Executive Director of CropLife South Africa at 011 805 2000 or  
Dr Gerhard Verdoorn, CropLife South Africa Consultant at 082 446 8946.

## References:

- 
- <sup>1</sup> Zimmerman, P.W. & Hitchcock, A.E. *Contribut. Boyce Thompson Inst.* 1942. 12, p. 321.
  - <sup>2</sup> Health Canada 2007. Re-evaluation of the Agricultural, Forestry, Aquatic and Industrial Site Uses of (2,4-Dichlorophenoxy) acetic Acid [2,4-D]. Proposed Acceptability for Continuing Registration. PACR2007-06. 19 June 2007. [www.pmr-arla.gc.ca/english/pdf/pacr/pacr2007-06-e.pdf](http://www.pmr-arla.gc.ca/english/pdf/pacr/pacr2007-06-e.pdf)
  - <sup>3</sup> USEPA 2012 (United States Environmental Protection Agency). EPA Denial of NRDC Petition to Cancel all 2,4-D Registrations. April 7, 2012.
  - <sup>4</sup> De Roos et al., "Integrative Assessment of Multiple Pesticides as Risk Factors for Non-Hodgkin's Lymphoma Among Men," *Occupational and Environmental Medicine*, 2003.
  - <sup>5</sup> USEPA 1994. EPA Science Advisory Board/Science Advisory Panel. An SAB Report: Assessment of Potential 2,4-D Carcinogenicity. Report No. EPA-SAB-EHC-94-005, March 22, 1994.
  - <sup>6</sup> USEPA 2005 (United States Environmental Protection Agency). 2005. Reregistration Eligibility Decision for 2,4-D. EPA 738-R-05-002. June 2005.
  - <sup>7</sup> USEPA 2007. 2,4-D, 2,4-DP, and 2,4-DB; Decision Not to Initiate Special Review. *Federal Register*: August 8, 2007 (Volume 72, Number 152. Page 44510-44511. [www.epa.gov/fedrgstr/EPA-PEST/2007/August/Day-08/p15109.htm](http://www.epa.gov/fedrgstr/EPA-PEST/2007/August/Day-08/p15109.htm)