

Message

From: Elliott Barry GBAP [/O=MESSAGING/OU=BE-AG/CN=RECIPIENTS/CN=BARRY.ELLIOTT]
Sent: 9/1/2006 4:55:05 PM
To: Akins Jonathan USGR [/O=MESSAGING/OU=BE-AG/CN=RECIPIENTS/CN=AKINSJO1]
CC: Pastoor Tim USGR [/O=MESSAGING/OU=BE-AG/CN=RECIPIENTS/CN=PASTOTI1]; Abbott John USGR [/O=MESSAGING/OU=BE-AG/CN=RECIPIENTS/CN=ABBOTJO1]
Subject: RE: Original of the "15 ml" statement

Jon,

I understood the Pond reference was the mainstay for this.

The mg/kg expressions can sometimes be confusing as they introduce a range of numbers.

Barry

From: Akins Jonathan USGR
Sent: 01 September 2006 13:39
To: Abbott John USGR
Cc: Elliott Barry GBAP; Pastoor Tim USGR
Subject: Original of the "15 ml" statement

John Abbott,

Regarding your question about the origin of the "15 ml" statement of a lethal volume for paraquat formulation, published literature cites the LD50 of paraquat in humans to be 3-5 grams paraquat. As stated in Pond et al., 1990, "the LD50 of paraquat by an adult human is approximately 3-5 g. This means that ingestion by an adult of as little as 10-15 ml of the 20% formulation can be fatal." In a review article, Lock and Wilks, 2001, reports that mild or sub acute poisoning is defined as ingestion less than 20 – 30 mg paraquat ion/kg and this rarely has serious consequences. Moderate to severe acute poisoning occurs when ingestion is more than 20 – 30 mg ion/kg but less than 40 – 50mg/kg. Hyperacute poisoning occurs following ingestion of greater than 40 – 55mg/kg and patients usually die within 4 days. (Lock and Wilks, 2001). The Environmental Health Criteria document on paraquat states: "The minimum lethal dose of paraquat is stated to be about 35 mg/kg body weight for human beings (Pederson et al., 1981; Bismuth et al., 1982). Symptoms of poisoning depend on the dose absorbed. It is difficult to estimate the dose absorbed from case histories since in many cases the patients spat out part of the paraquat concentrate or vomited profusely after swallowing the herbicide. Some patients have survived after apparently ingesting 50 - 100 ml Gramoxone^(R) (10 - 20 g paraquat), whereas some died after taking as little as 2 sachets of Weedol (2.5 g paraquat)." (WHO, 1984)

The calculation:

- 1) Lethal dose in humans = 3 - 5 g (3,000 – 5,000 mg)
 - a. On a mg/kg basis, this is calculated to be 42 – 71 mg/kg bodyweight for a 70 kg adult
- 2) 20% ion solution of Gramoxone = 200g paraquat ion/l (200mg/ml)
 - a. Potential Lethal dose = 3,000 – 5,000 mg / 200 mg/ml = 15 – 25 ml
 - i. This calculation may not have taken into account any potential effect of the emetic
- 3) Gramoxone = 240 - 360g paraquat ion/l (240 - 360 mg/ml)
 - a. Potential Lethal dose = 3,000 – 5,000 mg / 240 or 360 mg/ml = 8 – 21 ml
 - i. This calculation may not have taken into account any potential effect of the emetic

References

Lock EA and Wilks MF (2001). Chapter 70: Paraquat in *Handbook of Pesticide Toxicology, 2nd Edition*. Editor Robert Krieger. Academic Press, San Diego, CA.

Pond SM et al. (1990). Manifestations and management of paraquat poisoning. *Med J Australia* 152 256-259.

World Health Organization (1984). Environmental Health Criteria 39: Paraquat and Diquat (<http://www.inchem.org/pages/ehc.html>).

Barry and Tim, please provide any additional insight.

Thank you,

Jonathan Akins, Ph.D., DABT

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