

Diquat questions with answers provided by Dr John Clayton, Principal Scientist - Freshwater Ecology, NIWA 27.02.2015

- **Have there been any breaches of the label concentrations?**
 - *I'm not aware of any. Only licenced applicators can carry out spraying in public areas and they operate under very strict guidelines*
- **How do you ensure that the protocols are enforced? What is the procedure to become an approved/certified handler of diquat?**
 - *To become an approved applicator, you need to complete a specialised training course and hold an "Approved Handler Certificate" with specialised additional training for "Aquatic"*
- **How does it impact people?**
 - *Diquat is supplied in a formulation that contains 200 g/L of the active ingredient. At that concentration it would be toxic to humans. When applied, it is diluted to a concentration of 4 g/L tank mix and applied to the environment where concentration cannot exceed 5 ppm (5 mg/L). At the rates used to control aquatic plants it will not impact people and is less toxic than chlorine at rates used in public swimming pools*
- **How do you know it is not toxic at the concentrations used?**
 - *The herbicide has been assessed and approved for aquatic use by the EPA based on published toxicity and environmental fate data.*
- **Why 24 hour no swimming?**
 - *Entirely precautionary. In the USA there is no restriction. Unfortunately placing a restriction generated inappropriate concern.*
- **How can you be confident that the lagoon is not impacted later on by water flowing out of diquat treated areas?**
 - *Any treated water in the swamp will mix quickly to a dilution level as designed and intended for weed control. At the concentration achieved after mixing, there is no risk to humans even before rapid uptake by target plants and particles in the water & sediment. Water reaching the lagoon would have much less diquat (if any!) and insufficient to be of concern.*
- **Have you done water monitoring previously when diquat was sprayed at Te Henga?**
 - *No*
- **What would be the plan for water monitoring?**
 - *Not a statutory requirement, but water samples could be taken in a time series after application and analysed for diquat residue.*
- **Can you do an assessment of the entire wetland to ensure there are no side effects?**
 - *Extensive use of diquat and monitoring of impacts for over 50 years allays any concerns over side effects.*
- **What about the sediment?**
 - **Could you remove the sediment if you use diquat?**

- *There is no active residue left behind and so no need to remove.*
- **Has the sediment been tested at Te Henga or elsewhere?**
 - *Not from Te Henga.*
 - *MPI: Sediments have been tested at other sites, e.g. Lake Karapiro, see Chapter 3.7 of the Review of diquat reports of relevance to iwi values in Lake Karapiro, which have shown nil bio-accumulation. This was done for research purposes not because of negative effects.*
- **Does it persist in the sediment?**
 - *No active residue persists in sediment*
- **What about the residues – Some papers suggest it does accumulate although it is inactivated. How could it be re-activated? Can you test for the amount of residues?**
 - *It isn't reactivated naturally. If you want to test for residue you need to use extremely strong acid!way more dangerous than the 'inactive' diquat!*
- **I assume there is a potential saturation point of sediment for diquat binding which results in other undesired effects. Is there any way of knowing when such a point is reached- I am thinking here along the lines of soil testing (assuming other herbicides from farm runoff may contribute)?**
 - *Sediment is being generated continuously so capacity for adsorption of surplus diquat molecules reaching the sediment wouldn't be satiated.*
- **Is it possible to do blood-testing for diquat to ensure people are not impacted?**
 - *It is very unlikely that people would be exposed to diquat. No reason why you couldn't test blood for diquat.*
- **Can you please comment on details on the 25% of the wetland? There was some uncertainty around the definition of 25%. Is it meant per wetland/water body or per infested percent, which means you could spray a larger area, as long as the salvinia is scattered enough to not total up to 25%.**
 - *It is the area requiring treatment vs the area of suitable habitat as part of the same waterbody. So the wetland might be 25% full of salvinia so you can treat that area. This is a precautionary approach to ensure that decaying vegetation doesn't make the entire targeted area become short on oxygen, so as to avoid stress on any other aquatic organisms.*
- **Is there a maximum spray that can be applied to any given area over a period of time? The 25% rule does not state a specific time frame between sprays.**
 - *Two weeks is the stand-down time normally applied*
- **Can you please send us studies about diquat (e.g. NIWA)?**
 - *NZ and international reports are available on the internet*
- **Can you provide us with the adjuvants – sometimes they are the most toxic component of the herbicide?**

Adjuvants are not usually necessary when the aquatic weed is floating rather than submerged. The purpose of small amounts (c. 1%) of Sodium alginate and guar gum is to sink the diquat to reach the intended target depth required for submerged weeds. Note Sodium alginate and guar gum are both approved for use in the food and cosmetic industry.

- **What about the actual product? What else is in the product apart from diquat?**
 - *Colour (black) and stenching agent are added to make the product unappealing and to reduce risk of accidental ingestion*