

## Tech Note Liberate® Adjuvant



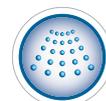
New to the Australian market is the Loveland adjuvant Liberate®, an odourless, neutral pH adjuvant derived from soybean based materials. Liberate® contains 40% more lecithin than Li700® and along with other components, gives superior drift reduction and leaf penetration ability. With Leci-Tech® inside, it presents to growers an adjuvant that is ideal to use with commonly applied products such as triclopyr, metsulfuron, 2,4-D, glyphosate and more, making it the ideal solution to the problem of which adjuvant to use for summer spraying.

### Penetrant, Deposition Aid, Drift Control Agent

Liberate is a premium penetrating surfactant, designed for use with pesticides. Liberate is designed for use with pesticides that recommend a non-ionic surfactant, and works especially well with systemic chemistry, reducing driftable fines.

LIBERATE® has a neutral pH making it an outstanding tank mix additive for sulfonyl urea and other pesticides that require a pH 7 (neutral) or higher.

### PRODUCT BENEFITS



Drift reduction with right-sized droplets

TO



Droplet retention by adhesion and spreading

ON



Increased penetration without cuticle disruption

IN

## Finding the right Adjuvant. Hydrophilic/Lipophilic Balance

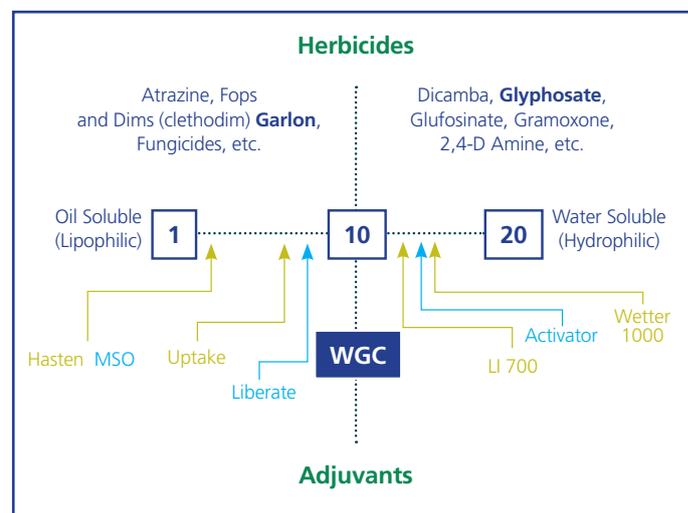
Active ingredients for herbicides can vary greatly in their degree of solubility in oil vs. water. This is referred to as the hydrophilic – lipophilic balance, or the HLB. Choosing the right surfactant for a specific pesticide (herbicide, fungicide or insecticide), or tank mix of pesticides, depends greatly on these solubility characteristics.

A highly water-soluble herbicide, such as glyphosate, prefers a more “water loving” or “hydrophilic” surfactant. A more oil-soluble herbicide, such as atrazine or clethodim, tends to do much better with a “lipophilic” or oil-loving adjuvant. In the simplest terms, a lipophilic herbicide should always be paired with a lipophilic adjuvant, and a hydrophilic herbicide should be used with a hydrophilic adjuvant.

In practice, we rarely use a single herbicide. When tank mixing herbicides with different HLB characteristics, it is important to have an adjuvant that bridges those differences. By way of example, if we tank mixed glyphosate and clethodim, we would want an adjuvant that had a balance of hydrophilic and lipophilic properties.

Using the wrong adjuvant with a herbicide can actually decrease herbicide performance, so carefully matching adjuvants and herbicides is important. Adjuvants, like herbicides, come in a broad range of HLB values – some are more oil soluble (lipophilic), some are more water soluble (hydrophilic).

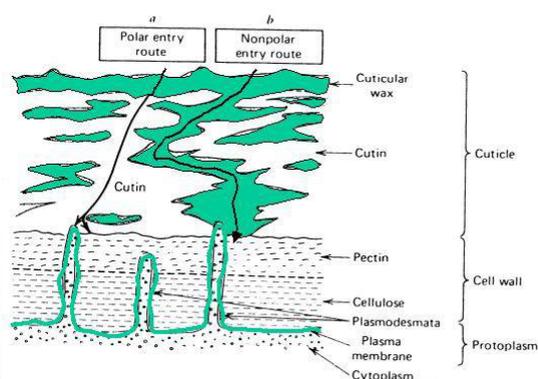
## Matching Herbicide and Adjuvant HLB



## Spray penetration

Leci-Tech® allows the formation of micelles to occur at lower use rates than traditional surfactants, providing quicker uptake with no impact on crop safety. To maximize performance of both systemic and contact pesticides it is critical to ensure penetration through the leaf cuticle. This is especially important when plants are under environmental stress. Leci-Tech® chemistry will also reduce evaporation, allowing for greater uptake.

Figure 2. Absorption routes from leaf surface to cytoplasm. (Ashton and Crafts. 1981.)



Green areas represent lipophilic regions: epicuticular wax, cell membrane (plasma membrane).

## Phytotoxicity, Translocation & Herbicide Efficacy

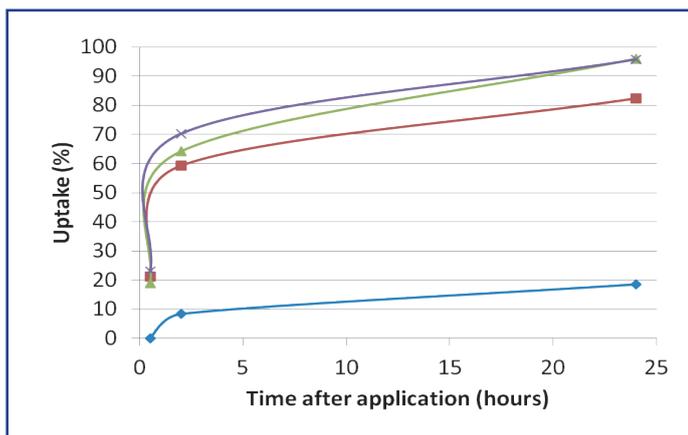
Loveland Agri Products have conducted our own research trials and commissioned independent laboratory research by Plant Protection Chemistry New Zealand (PPCNZ) to compare Liberate with other crop oils on the market.

These studies were to evaluate phytotoxicity, translocation, the rate of herbicide uptake, drift and spray droplet retention.

The results are as follows:

### Annual Ryegrass Uptake Conducted by PPCNZ

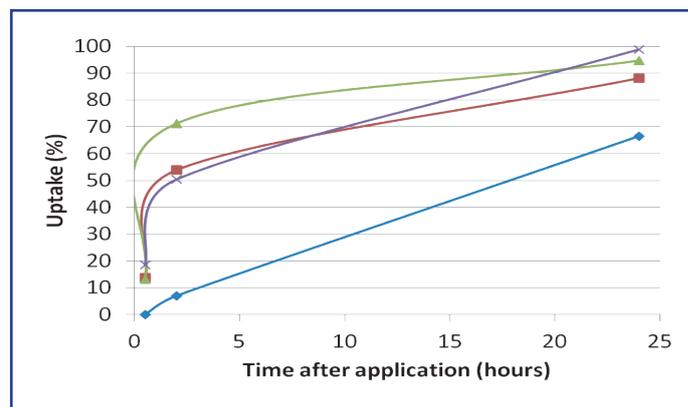
Glyphosate 450    ◆ +Liberate at 0.25%    ▲  
 + Liberate 0.5%    ✕, + 0.5% Uptake oil    ■



\*Trial conditions established to simulate stressed conditions

### Annual Ryegrass Uptake Conducted by PPCNZ

Glyphosate 450 and Genfarm Triclopyr 600EC    ◆  
 +Liberate at 0.25%    ▲ + Liberate 0.5%    ✕  
 + 0.5% Uptake oil    ■



\*Trial conditions established to simulate stressed conditions

## Conclusions

Overall, the addition of the tank-mix adjuvants to Glyphosate 450 applied alone, or in combination with the Genfarm Triclopyr 600 herbicide, significantly enhanced the uptake of glyphosate over the 24 hours, significantly increasing the rate of uptake, and therefore the rain fastness of glyphosate. Overall, there was no benefit from using the higher concentration of Loveland Liberate.

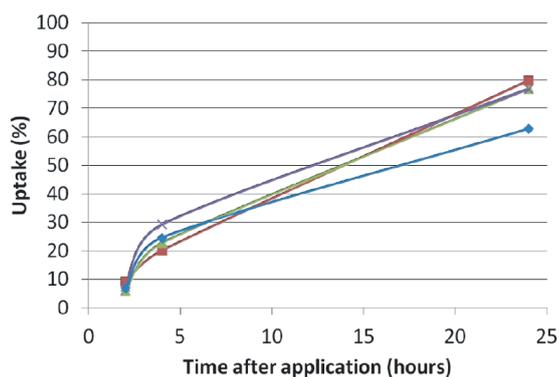
0.25% Liberate + Glyphosate 450 / Triclopyr 600 herbicide mix was significantly better than 0.5% Uptake oil and 0.5% Liberate at 2 HAT, with no differences between Liberate and Uptake oil used at 0.5%.

Alison Forster, David Horgan and Rebecca van Leeuwen – PPCNZ A report produced for Landmark 2015

## Tech Note Liberate<sup>®</sup> Adjuvants

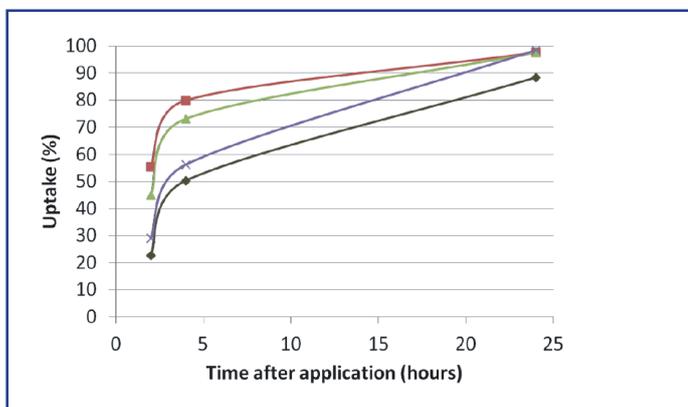
### Pie Melon uptake Citrullus Lanatus Conducted by PPCNZ

Fig. 1: The uptake, into pie melon, of glyphosate from Glyphosate 450 plus Genfarm Triclopyr 600EC alone or applied in the presence of Liberate at 0.25% or 0.5% or 0.5% Uptake oil



\*Trial conditions established to simulate stressed conditions

Fig 2: The uptake, into pie melon, of triclopyr from Genfarm Triclopyr 600EC plus Glyphosate 450 alone or applied in the presence of Liberate at 0.25% or 0.5% or 0.5% Uptake oil



\*Trial conditions established to simulate stressed conditions

## Conclusions

Fig. 1: The addition of Liberate at both 0.25% and 0.5% significantly enhanced the glyphosate uptake into pie melon from the Glyphosate + Triclopyr combination at 24 HAT. Liberate at both rates performed as well as Uptake. This shows that Liberate can be used at a lower rate than Uptake.

Fig. 2: At 24 HAT both rates of Liberate are equivalent to Uptake in increasing the uptake of Glyphosate + Triclopyr into pie melon. At this time, there was a numerically enhanced uptake of the product mix when Liberate at either rate was used. This indicates that Liberate can be used at a lower rate than Uptake for enhanced herbicide uptake.

## Contact Phyto

All treatments containing Uptake oil (0.5%) exhibited some contact phytotoxicity at 24 HAT (see Photo A as an example) while Liberate used at either 0.25% or 0.5% exhibited only very light contact phytotoxicity (1-3 drops out of 10 demonstrated very light contact phytotoxicity on 3/5 replicate leaves) and only when Glyphosate and Triclopyr were used in combination (see Photo B as an example). It has been shown (e.g. Geiger and Bestman 1990, Prasad and Cadogan 1992) that contact phytotoxicity can confine the active ingredient physiologically to the site of penetration, thereby decreasing performance (i.e. while one adjuvant may enhance uptake more than another, if it causes more contact phytotoxicity then translocation may be reduced, reducing biological efficacy).

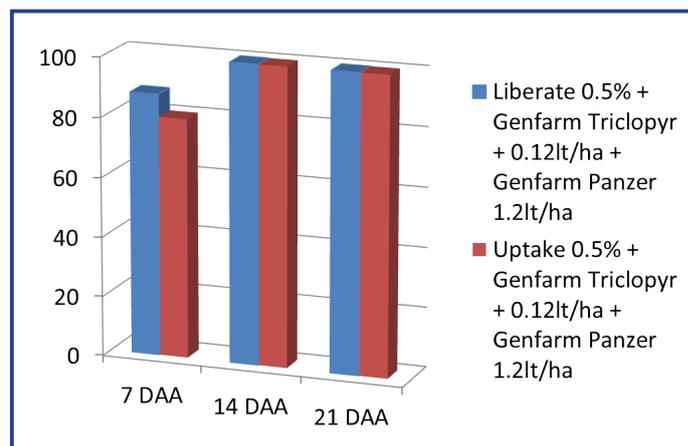
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Photo : Example of contact phytotoxicity on pie melon caused by (A) Uptake oil (0.5%) and (B) Liberate (0.25%) in the Glyphosate 450 / Genfarm Triclopyr 600EC product mix.

## Herbicide efficacy Camel Melon Control Temora 21 DAA Conducted by Landmark

### Untreated 21 DAA



### Uptake 0.5% 21 DAA



### Liberate 0.5% 21 DAA



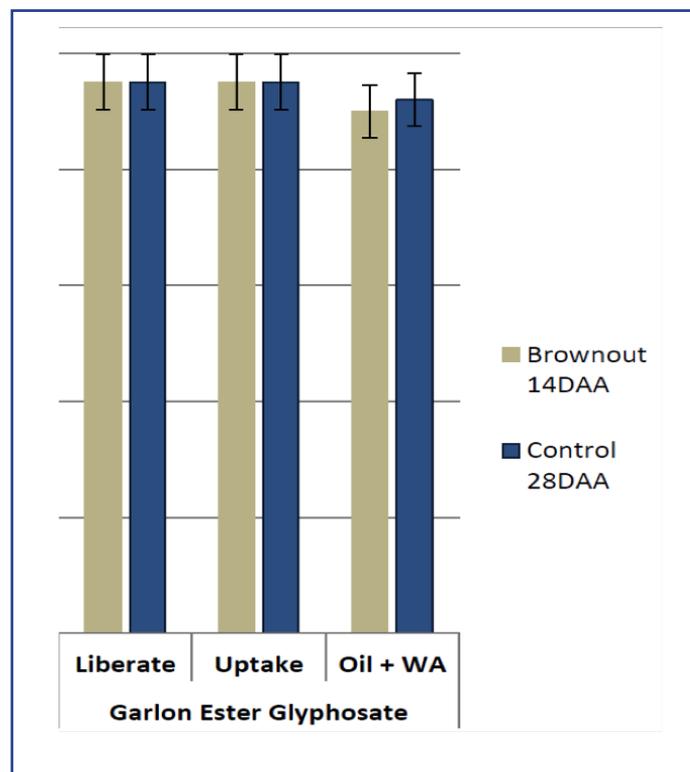
### Efficacy

All Liberate treatments recorded similar to if not slightly improved Weed control % when compared with Uptake and equivalent mixing partners.

## Garlon™ and Glyphosate 450 + Ester680 treatments Trial on Paddy Melon

The use of Liberate® suits Glyphosate plus Garlon™ brews, as the label recommends avoiding the use of oils such as Uptake™ when glyphosate is in the mixture. Liberate® sits relatively neutral on the Hydrophilic / Lipophilic scale, which ensures that the activity of glyphosate will not be reduced, when chasing a mixed stand of weeds including both melons, grasses and hard to kill weeds i.e. fleabane.

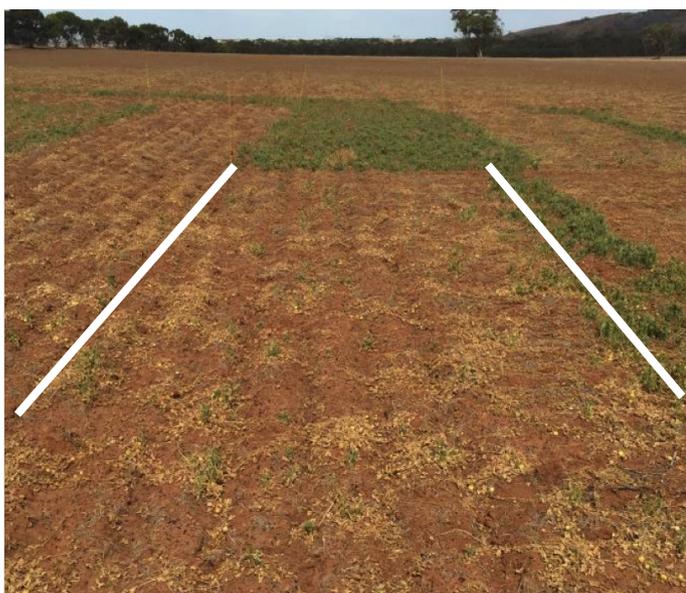
*(Kirsty Smith- Summer Adjuvant Trial 2014)*



## Garlon Ester & Glyphosate Trial WA 28DAA

**Garlon 100ml + Glyph 1.2L + Ester680 400ml with 0.5% Liberate**

**Garlon 100ml + Glyph 1.2L + Ester680 400ml and 1% Oil + 0.2% WA**



## Drift Reduction

Leci-Tech® chemistry reduces fine droplets without increasing the number of large droplets. The result is more of the right sized droplets, which not only reduces the risk of droplet drift, but also reduces shatter and bounce for optimised nozzle performance.

### Without Leci-Tech



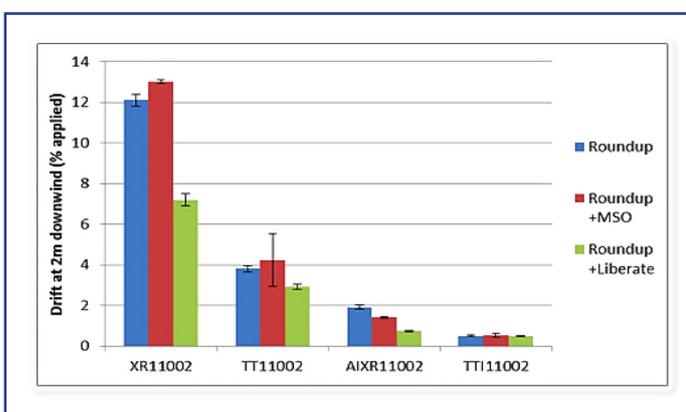
### LIBERATE



### Polymeric Drift Agent



### Lecithin-based Drift Agent



All treatments applied with Ultramax & 2-4D amine

Treatments:

- MSO Lecitech @ 1%
- Hasten @ 1%
- Liberate @ 0.25% & 0.5%
- Uptake @ 0.5%
- Wetter 1000 @ 0.25%

Best treatments advanced to drift trials (wind tunnel)

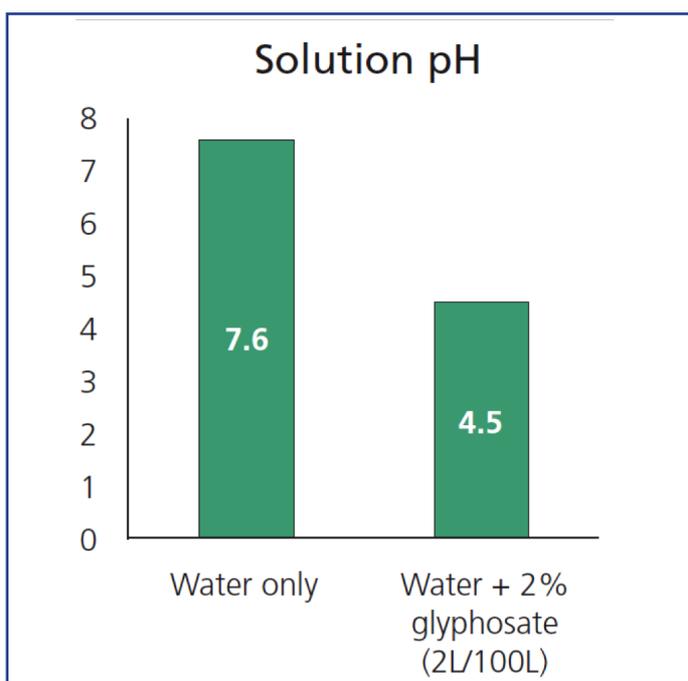
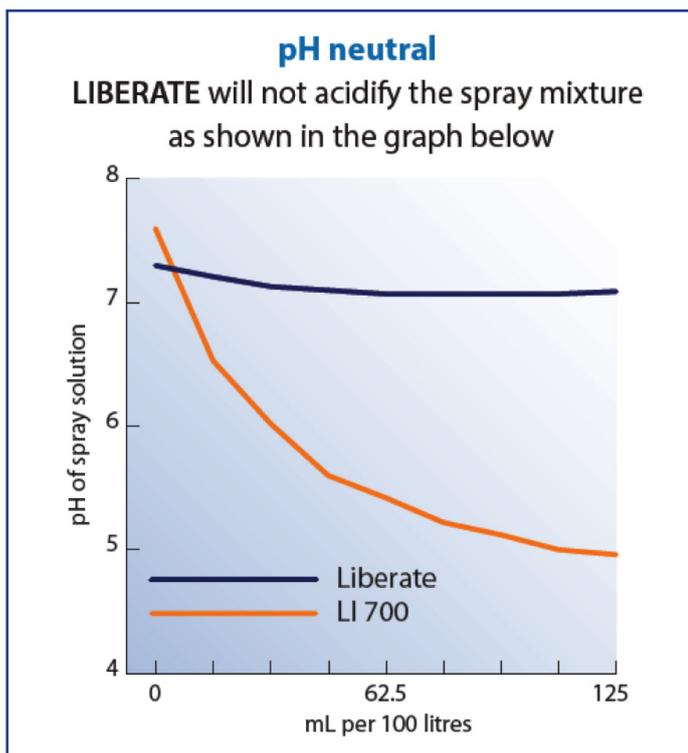
The clear “winner” for a very effective reduction in drift is Liberate. Dr Andrew Hewitt.

*Spray drift – The University of Queensland (Andrew Hewitt)*

## Tech Note Liberate® Adjuvants

### Effect on water quality when a spray works best. At a lower pH

Liberate® does not contain an acidifier. Acidification is generally not required for glyphosate based sprays, because glyphosate is a weak acid and acidifies water on its own.



The figure above shows that when glyphosate herbicide is added to spray water, it drops the pH and no further acidification is required.

### Landmark recommends

In addition to drift reduction, improved spray retention and penetration, Liberate® also provides improved translocation, quicker uptake, reduced droplet evaporation in the one, easy-to-use adjuvant.

Landmark recommends growers use Liberate® as an adjuvant for the majority of summer spraying (please check with your Landmark agronomist that Liberate® is suitable for your intended tankmix). With the combination of hydrophilic and lipophilic elements, Leci-Tech® works well with both water-soluble and oil-soluble herbicides. The superior droplet modification and drift reduction ability means that more herbicide will reach the leaf, and be taken up by the plant.

**The recommended use rate of Liberate® ranges from 250–500mL/100L water. The higher rate should be used when spraying in warm conditions or when oil soluble herbicides such as triclopyr or 2,4-D Ester are part of the tankmix.**

To replace adjuvants	Liberate® use rate
Mineral oil 1%	0.50%
Uptake 0.5%	0.50%
Li700® 0.25%–0.5%	0.25%–0.5% **

For more information, please visit [loveland.landmark.com.au](http://loveland.landmark.com.au)