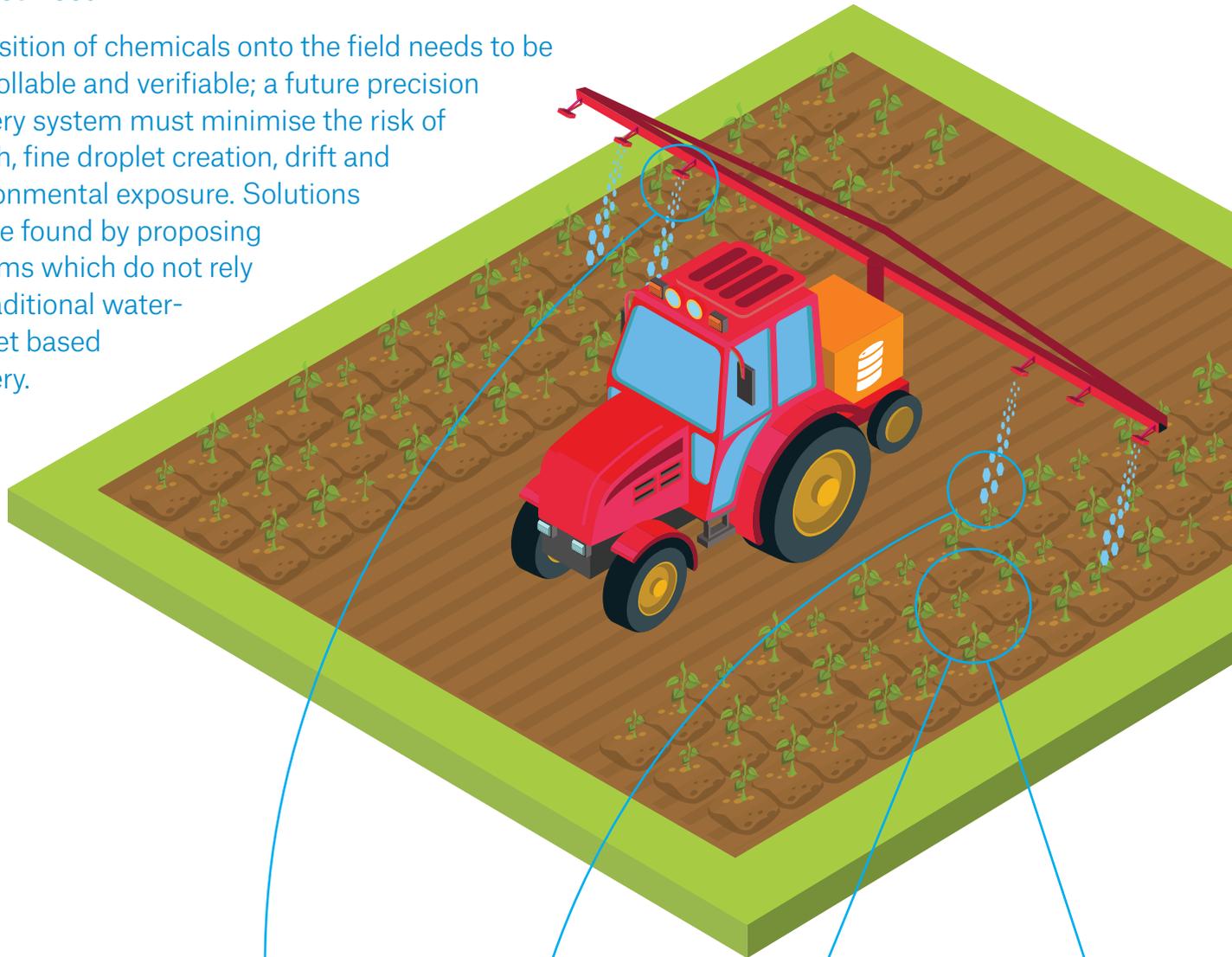


A frozen solution for precision spraying

Market Need

Deposition of chemicals onto the field needs to be controllable and verifiable; a future precision delivery system must minimise the risk of splash, fine droplet creation, drift and environmental exposure. Solutions can be found by proposing systems which do not rely on traditional water-droplet based delivery.

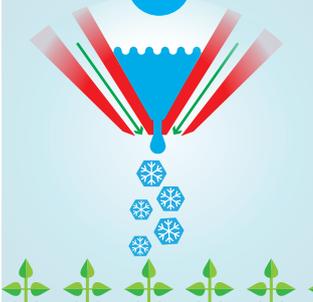


1



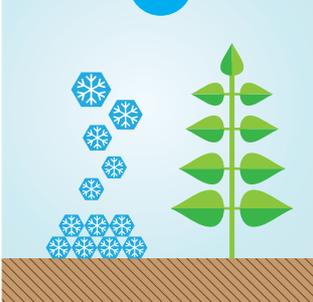
Standard formulation of highly effective pesticide or herbicide requiring no change to equipment and distribution network

2



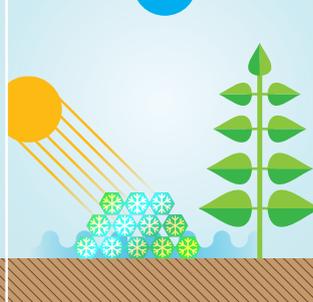
Formulation is frozen at the point of delivery forming discrete, solid particles of formulation

3



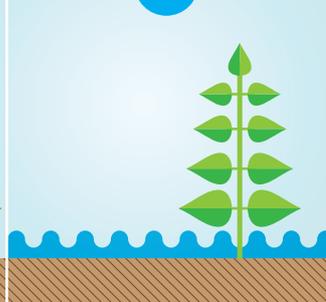
Solid particles do not create splash back or fine droplet creation; precision delivery system is enabled to guarantee delivery to a specific location

4



Measurement and verification of delivered dose is facilitated by high reflectivity of unique delivery format

5



Ice particle rapidly melts, delivering active ingredient to the point of need with no excess residue

Why is a frozen solution the best option?

Eliminating or reducing fine droplet production whilst maintaining the cost effectiveness and straightforward delivery format of aqueous solutions might be achieved through adjusting the viscosity of the solution. However, thickening through the addition of viscosity modifiers could result in a challenging re-registration of the product and will make moving the product through a spray system more difficult, requiring much higher power pumps and limiting rapid flow control options.

The physics of droplet creation in a spray nozzle are determined by solution viscosity, amongst other things, and not easily predicted, so control of the product during application is a significant challenge. We suggest that a different option would be to deliver a frozen solution.

Why it works



Formulation could be flash frozen in the spray nozzle, forming solid droplets for application, or turned into a semi-solid slush to be dropped in place



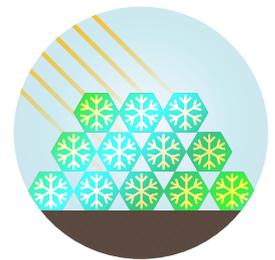
Solid delivery methods hugely mitigate any risks of fine droplet production as there is a much lower tendency for breakup and splash-back



Formulation can be unchanged, minimising any challenges associated with registration of products



Most of the fluid handling can be done as a normal aqueous formulation: standard pumping and metering technologies can be used up until the flash-freeze just prior to delivery to the ground



Verification of the delivered formulation would be vastly improved over current aqueous techniques - reflective properties of ice would make it stand out against the field. Product coverage could be verified and recorded for any regulatory requirements