

New & future developments in sprayers - summary

Mikkel Nilars, Cand. Agro. M.Sc.
Head of HARDI ACADEMY
HARDI INTERNATIONAL A/S
Denmark

New developments

Modern sprayer development focuses more and more on the easy of use for the operator. The aim is to minimise operator fatigue and to avoid fatal operator mistakes. All operations related to spraying has been divided into spraying operations and service operations and they have been prioritised in relation to operator stress.

Spraying operations

- Steering the tractor
- Boom height adjustments
- Controlling tractor speed
- Open and closing sections
- Variable rate control

Service operations

- Cleaning
- Chemical filling
- Water filling
- Calibration
- Folding / unfolding booms
- Nozzle / filter cleaning

With the basis in this list the engineers has developed a range of intelligent features to assist the spray operator. Some of the features are not only related to spraying and will normally be handled by the tractor manufacturers.

Spraying operations

Boom management

More and more sprayers can now be delivered with at boom management system. Most of the systems on the market are simple distance sensors taken from e.g. the car industry. This gives a lot of restrains to the performance of these systems. At HARDI a thorough study, both at test tracks and in the field, resulted in the selection of a Canadian system designed especially for farming. This system is one of the only systems which can actually “see” the difference between the vegetation and the ground – and therefore the only systems which can be used in open crops or in row crops.

Automatic Section Control

To minimise the overlap when crossing already sprayed areas the automated section control can be of great help. The ASC takes care of controlling the individual boom sections and thereby avoiding overlap and saving chemicals (see figure 1). Practical use has shown a reduction in chemical use of up to 4% by reducing the overlaps with the use of ASC and GPS.

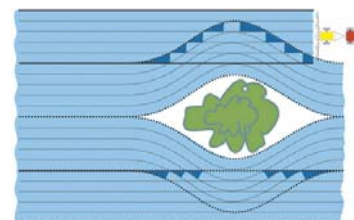


Figure 1:
AutoSectionControl

Service operations

Automatic cleaning

A good example of a automated cleaning system is the HARDI AutoWash feature on COMMANDER and ALPHA sprayers. By changing all valves on the sprayer to electrical valves – and then controlling these by sophisticated software – the sprayer can clean itself totally on the inside. The process is optimised and consists of up to 39 steps which clean the machine better than a trained operator will be able to do – an without the risk of making mistakes.

Filling chemicals

Most of the larger sprayers today have induction hoppers as standard equipment. These hoppers makes chemical filling so much safer and easier compared to filling through the tank lid. There are huge differences between the performance of the different designs on the hoppers. Especially their capability of mixing in powders is very different.

Filling water

The biggest risk when filling water is normally overfilling the sprayer. Automated filling systems is now on the market; some of them is a simple flow meter combined with a electric valve, that shuts off when a preset volume is filled in the sprayer – other system is more sophisticated as they measure the actual tank volume and can also avoid overfilling the spray tank.

Focus on economy

Farmers of today have maybe more than ever the need for constant focus on the economy in their business. Since the sprayer is the machine on the farm (apart from the tractor) which is used the most and on top of that is applying chemicals of high value to the fields, it is essential that it is used in the most efficient way. Sprayer capacity and chemical dose are both closely related to the economy. If these are both managed correctly there is a high potential to increase the profit on the spraying budget.

Increased capacity

Capacity can normally be increased in to ways – more ha/hour or more hours/month for spraying.

More ha/hour

To get more ha/hour we need to either drive faster or to minimise the service time. If we drive faster we increase the risk of drift and normally also decrease the deposit of chemicals on the target plants. Minimising service time is often meaning lower water volume (= less time for filling the sprayer). The lower water volume are giving the same result as above – higher drift risk and poorer deposit.

Drift is normally of high focus because of the environmental problems. Drift has however another important effect – which is sometimes forgotten. Large, high-speed sprayers – often applying low water volumes – may inadvertently be applying a non-uniform swath. Even at low wind speeds drift can easily give a 20-30% difference in the spray deposit at different locations under the boom.

More hours/month

To increase the “spraying window” (hours where spraying is possible) we need to be able to spray in more windy conditions. A guideline is normally, that we should avoid spraying at wind speeds above 4 m/s. With some drift reducing techniques (coarse nozzles or HARDI TWIN air assisted sprayers) it is however possible to spray wind speeds up to 8 m/s. If the limit is increased from 4 m/s to 8 m/s (and all other factors kept the same) the number of hours/month are nearly doubled

TWIN air assistance is today the only system which can increase the spraying window and keep the high chemical efficacy from fine droplets at the same time.

Reduced chemical dose

The budget for chemicals on modern farms is today very high. Therefore an even small reduction in dose has an effect on the profit. Reducing the chemical dose is possible, but it puts high demands to the way the chemicals are applied. Timing and distribution are critical to ensure a good result. Drop sizes has to be optimized and uneven distribution caused by drift has to be avoided. This means either spraying in optimal weather conditions at low driving speed or using a HARDI TWIN sprayer.

Danish farmers has over the last 20 years been working intensively with reduced chemical dosages. A very detailed advisory system has been build up, so the farmers today get detailed information about the best chemical to use and in which dose to use it

The Danish system has clearly shown, that if the correct spraying techniques are used it is possible to make a good and efficient plant protection with sometimes as low as 20-30 % of the recommended label dose. In that way the farmers are increasing profit and helping the environment at the same time.

Further information

Read full article (link to pdf with full article).

Crop Protection Online - the Danish system to choose chemicals and dose:

- <http://pvo.planteinfo.dk/cp/menu/menu.asp?id=demo&subjectid=1&language=en>
(click: “solve problem”)
- http://www.lr.dk/planteavl/informationsserier/info-planter/plk07_crop_congress.htm

Guidance to calibration, nozzle choice and reduced drift and increased capacity:

- <http://www.hardi-international.com>