

Why Spraying Efficiency Matters

“Time is money”, an old saying but it matters in farming and it matters especially with spraying. Applying products at the right time is critical to their performance; and spray windows when wind, weather and soil conditions are right are few and far between. Typically there are only 100 days per annum when there are ideal spraying conditions, so it is important to make the most of these opportunities.

Missing the right time or spraying in the wrong conditions can mean lost yield, repeat treatments and sub-optimal performance. On top of this operators who are pushing the boundaries of the spray window may also break the law by spraying in unsuitable weather.

This guide looks at aspects of spraying that effect work rates and thus the time-ness and efficiency of spraying. Much depends on the choice of sprayer, however, even with older equipment, improvements in performance can be made with better organisation and changes to working practice.

Choosing the Sprayer

Buying a new or reconditioned and tested sprayer is something that happens only every 5-7 years on most farms, yet the choice and design features of the sprayer will fundamentally affect the work rates achieved. Most farmers will have a good understanding of their spraying needs, but it is worth thinking about just how much time is spent spraying, the total area that is treated each year i.e. area x number of visits and identifying the peak spraying times. It's also a good idea to discuss your plans with your agronomist, as they can point to where missed applications had consequences and identify where more timely applications could save money.

Trailed, Mounted or Self-Propelled

Setting up the sprayer and attaching it to the tractor can take time. Remember to consider how easy it is to start the job, self-propelled sprayers are more expensive but they are ready to run and therefore should take less time to set up and are capable of working faster in the field.

Boom Width

Increasing boom width will increase your work rates, it will also decrease the area of land lost to wheelings and decrease associated erosion risks. However wide booms need to be set in the context of field size, slopes and undulations therefore they are only really practical on large flat fields. Spraying too high to compensate for undulations will increase drift significantly. For most nozzles the optimum height above the target is 0.35-0.5m so bear this in mind when considering larger boom widths. Remember also that wide booms can be heavier and may take longer to fold away. Setting the boom too low will compromise crop coverage and can risk damaging the crop and sprayer boom. Remember that changing tramline widths will also effect seed drills and fertiliser applications.

Tank Size

Larger tanks mean that a greater area can be treated per load, making most efficient use of time spent travelling and setting up in the field. However larger tanks may increase compaction risk and filling time.

Pump Capacity

Extra time spent waiting to fill the sprayer with water after filling and cleaning the containers is wasted time. This will be particularly noticeable when only simple tank mixes are applied and few cans need cleaning.

Convenience Factors

Induction bowl height and position, layout and accessibility of controls can all affect ease of filling and cleaning; filling area design, location of pesticide store and arrangements for sprayer cleaning will also have an impact on efficiency of operation (see next section).

Timing is Money

- Late application of blight spray on potatoes = Up to 5 t/ha lost yield
- Missed autumn application of cereal herbicide = >1 t/ha lost yield
- Delayed fungicide application on wheat = 0.5t/ha per week lost yield
- Caught spraying in windy conditions potential £5,000 fine

Improving Work Rates

Reduce travelling time

- Get as big a sprayer tank as practical
- Use lower water rates
- Consider extra filling points or bowser/mixer

Reduce Filling Time

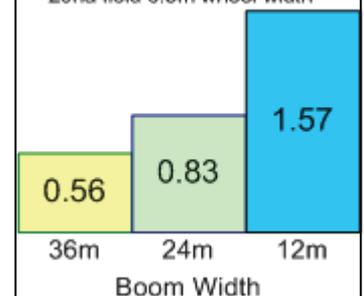
- Choose larger can sizes
- Use simple tank mixes
- Easy to use formulations
- Consider larger capacity pump

Increase Field Work Rate

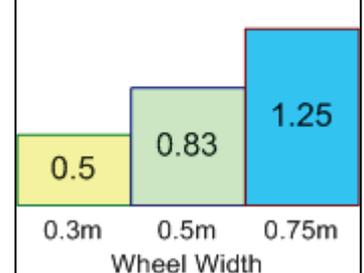
- Increase boom width
- Faster ground speed
- Reduce water volumes

Uncropped Area (ha)

Tramline Area and Boom Width
20ha field 0.5m wheel width



Tramline Area and Wheel Width
20ha field 24m boom width



Filling and Handling Logistics

◆ Filling Area Layout

A well laid out filling area with water and chemical store close at hand can reduce time spent carrying and walking around the sprayer. Make sure there are no trip hazards and that there is a working surface for weighing and measuring chemicals.

◆ Travelling Time, Extra Filling Points & Bowsers

Time spent travelling between the field and the filling area is wasted. Where large areas have to be sprayed consider setting up a secondary filling point (note a secure pesticide store and water source will be needed). Alternatively a bower bringing clean water or pre-mixed pesticide solution can speed up the operation but will require extra staff. When considering the logistics for the job, take account of travelling time, time filling the bowser/sprayer and time spraying. Ideally bowser filling plus travelling time should be either the same as or less than spraying time.

◆ Sprayer Filling

It is always best to clean containers when filling the sprayer (see Best Practice Guide on Container Cleaning). However a lot of down time can be spent cleaning containers especially when making applications involving 4 or more products. Discuss with your agronomist how tank mixes can be simplified and which are the easier formulations and packaging types to clean. Using larger packs up to 5-10 litres, will reduce the number of packs that need cleaning. Some formulations and pack designs are also easier to clean than others, while returnable packs (if available) require no cleaning.

◆ Sprayer Cleaning

Regular sprayer cleaning is important to avoid risk of crop damage, but following the correct procedure (see Guide on Sprayer Cleaning) can take time especially if a complete clean is needed. Ensure the sprayer has tank rinsing nozzles that can speed up this exercise and improve efficiency and a clean water tank of sufficient capacity and a hose and brush attachment for external washing. It is also important to organise spraying operations in such a way that a full clean is not needed every day.

Field Application

◆ Speed

Increased ground speed will increase work rates but can also have an significant adverse impact on spray quality, the risk of drift and reduced accuracy of application. Adopting faster application speeds without adjusting water volumes (see below) or nozzle type has the potential affect of reducing the dose and increasing the risk of drift.

◆ Nozzles

Nozzle choice will effect spray coverage, work rates and the risk of drift. Conventional nozzles with high flow rates will produce larger droplets, potentially increasing coverage and result in a lower risk of drift, however the higher flow rates will reduce field work rate. The opposite is true for nozzles with low flow rates. However nozzle design has a substantial effect on droplet size, coverage and risk of drift, so that it is possible in many situations to select a nozzle (e.g. air induction) with low flow rates, low risk of drift and adequate coverage. For more advice refer to the HGCA Nozzle Selection Chart and the Guide on Nozzle Selection and Maintenance.

◆ Water Rates

Reducing water rates can increase the area treated per load and thus increase work rates. Always check the pesticide label for water rates, conventional label advice on pesticide application is to use 200L water per ha. This is the water rate used by pesticide manufacturers in their trials to ensure the product will work in a range of situations. However many growers use the reduced volume spraying arrangements permitted in the Code of Practice, with water rates as low as 100L/ha. Reduced volume spraying -down to 10% of the label recommended volume - is allowed subject to the following:

- No specific restrictions on the label such as maximum in use concentration or minimum volume, or
- PPE is not required to be worn when the product is ready for use, or
- The product is not classified as corrosive, very toxic, toxic or risk of serious damage to eyes.

In practice many products work well, and in some cases better, at 100L/ha but going much lower than this, except with specialised spraying systems, can compromise efficacy. In addition, ways of reducing water volumes such as increased speed and smaller nozzles can also increase the risk of drift. Using lower water volumes should always be discussed with your BASIS registered agronomist. Higher water volumes (150-200L/ha) are often needed when treating dense crops, where stem based diseases are the target, or a good crop coverage is required for contact acting materials.

Air Induction (AI) Nozzles

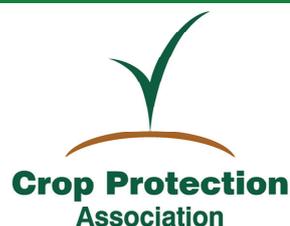
For a given flow rate, AI nozzles create larger droplets with a lower risk of drift. This means that work rates and efficacy can be improved by using AI nozzles with low flow rates without increasing drift. Note droplet characteristics vary between nozzle manufacturers, so check which nozzle to use with the nozzle manufacturer or your agronomist.



Summary

Whatever your sprayer there are some basic underlying principles:

- **Large self-propelled sprayers** will, field size permitting, always do the job quicker. Because of their high field work rate, a disproportionate amount of time can be spent driving between fields and filling, so consider the use of extra filling points, or a bowser and more efficient filling practices to increase work rates.
- **Traditional mounted sprayers** are slower all round but the easiest efficiency gains can be made in the field by using the right nozzles to lower water rates, and a faster ground speed.



The advice in this Guide has been prepared after consultation with CPA members, AIC, TAG and the Silsoe Spray Application Unit.

This Guide was produced by the Crop Protection Association as part of The Voluntary Initiative.

The Voluntary Initiative is a programme of measure agreed by Government to minimise the environmental impact of pesticides.

www.cropprotection.org.uk

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