

# Dr Watson's Three steps to accurate application



Accurate sprayer calibration is essential to know what volume of spray is being applied. Calibration is a straightforward process that, once established as a routine, takes just a few minutes and can make a significant difference to accuracy and results.

Calibration is a three stage process:

- Establish the accurate forward speed used when spraying
- Identify the output per nozzle
- Calculate the application rate per hectare



## Check sprayer speed



Accurately measure out a run of 100m on a turf surface, using a cane to mark each end



Using a stopwatch, start timing as you drive over the first cane at full spraying speed; stop the clock as you drive over the second cane (it's easier and more accurate if a colleague can assist with the timing)



Divide 360 by the time taken to drive the 100m in seconds = speed in km/h



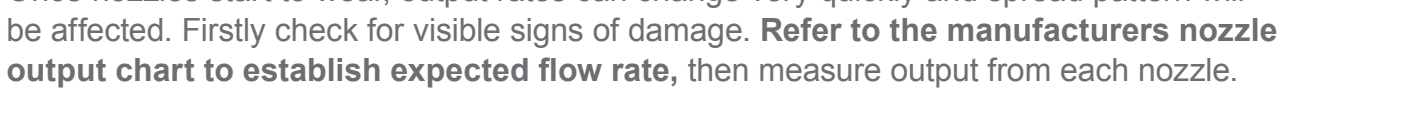
Repeat if different spraying speeds are used for different areas, e.g. greens and fairways



**ACCURACY CHECK** – At slower spraying speeds any differences dramatically affect application rate. If you aim to spray greens at four km/h, for example, actually spraying at three km/h will increase the application rate by a massive 33%.

## Check nozzle output

Check nozzle output at least twice a year, and ideally each month during busy spraying periods. Once nozzles start to wear, output rates can change very quickly and spread pattern will be affected. Firstly check for visible signs of damage. Refer to the manufacturers nozzle output chart to establish expected flow rate, then measure output from each nozzle.



**ACCURACY CHECK** – Some trace element and liquid fertilizer formulations used in turf applications are particularly abrasive and can lead to high rates of nozzle wear. Check nozzles more regularly when using these products.

Fill the tank with clean water, set the pump to the standard operating pressure and collect the output from each nozzle for 30 seconds. Ideally use a Syngenta Sprayer Checker calibration cylinder



Note down the output from each nozzle. Add up the total and divide by the number of nozzles, to give the average output per nozzle across the boom



Calculate the difference from average for each nozzle. If the output from any nozzle is +/- 5% of the average, the nozzles are unacceptably worn and the complete nozzle set should be replaced



**ACCURACY CHECK** – Always use a calibration cylinder for checking nozzle output; measuring jugs are good for measuring product, but are not sufficiently accurate for checking nozzle flow rates.

## Calculate application rate

With the knowledge of the forward speed of the sprayer and the output from nozzles, the volume of spray being applied per hectare can be calculated:

$$\text{Nozzle output (l/min)} \times 600 \div \text{forward speed (km/h)} \div \text{nozzle spacing (m)} = \text{spray volume (l/ha)}$$

Spray volume output can be adjusted by:

- Changing the forward speed
- Altering the operating pressure
- Changing to different sized nozzles

Use the free on-line Sprayer Set-up Calculator tools in the Syngenta GreenCast Application Zone website to see what changes are required to deliver any required water volume.

## Case study calculation

To apply a water volume of 300 l/ha, using a sprayer with 0.5m nozzle spacing and operating at five km/h, for example, the GreenCast calculator shows that you require a nozzle output of 1.25 l/min.



### Sprayer Set-up Calculators

What nozzle output (l/min) is required to apply X l/ha?

Volume (L/ha)	Nozzle Spacing (m)	Speed (km/h)	Nozzle output (L/min)	Reset Form
300	5	5	1.25	

Refer to the nozzle manufacturers output charts to select an appropriate nozzle to deliver this output at an appropriate operating pressure, typically 2.5 to 3 kPa.

Having fitted the nozzles, set up the sprayer as you would use it and check the output per nozzle, you could find that the volume collected may be 1.35 l/min, for example.

How many l/ha will a nozzle output of X l/min apply?

Nozzle output (L/min)	Nozzle Spacing (m)	Speed (km/h)	Volume (L/ha)	Reset Form
1.35	5	5	324.00	

The second GreenCast calculator would tell you that this combination would actually apply a water volume of 324 l/ha. With this knowledge, you could put 321 litres of water in the tank with 3 l/ha of Medallion TL, for example, and be confident that the correct product rate is being applied per m2.

However, if you want to correct the sprayer operation to deliver precisely 300 l/ha, the GreenCast Calculator shows how to adjust the sprayer speed (which in practice can be difficult to reliably achieve), or to adjust the operating pressure - which can be more precise for fine tuning, providing the spray pattern is not compromised.

What speed do you need to travel to apply X l/ha with a nozzle of known output Y l/min?

Volume (L/ha)	Nozzle Spacing (m)	Nozzle output (L/min)	Speed (km/h)	Reset Form
300	5	1.35	5.40	

How Much Pressure Do you need to Achieve an output of (Output 2)

Nozzle output (L/min)	Pressure (kPa)	Output (2) (L/min)	Pressure (2) (kPa)	Reset Form
1.35	3	1.25	2.57	

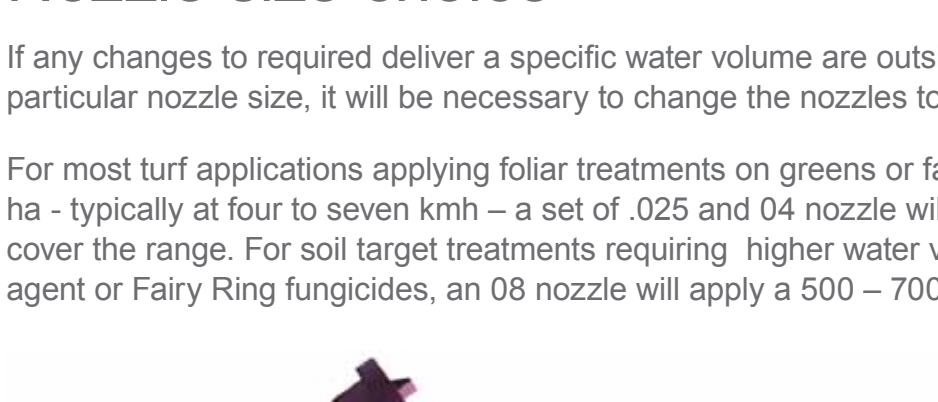
In this case, either increasing the speed to 5.4 km/h, or reducing the operating pressure to 2.57 kPa, would both have the desired effect.

The GreenCast calculators enable you to work out any given set of permutations to achieve the desired result.

## Nozzle size choice

If any changes to required deliver a specific water volume are outside the realistic operation of a particular nozzle size, it will be necessary to change the nozzles to a smaller or larger size orifice.

For most turf applications applying foliar treatments on greens or fairways at 250 to 350 l/ha - typically at four to seven km/h - a set of .025 and 04 nozzle will be most appropriate to cover the range. For soil target treatments requiring higher water volume, such as wetting agent or Fairy Ring fungicides, an 08 nozzle will apply a 500 - 700 l/ha at six to seven km/h.



New Syngenta XC Nozzle range available in 025, 04 and 08 sizes - to be launched at BTME in January 2013.

**ACCURACY CHECK** – Sprayer calibration will tell you precisely the water volume being applied, but it is equally important to know the exact size of the area being treated to ensure consistent accurate application. GPS mapping of greens and fairways is becoming increasingly available and affordable.



- Calibrate sprayers regularly, especially during busy periods
- Inspect sprayers for leaks or damage during calibration
- Record results of nozzle set calibration and sprayer settings
- Replace the whole set of nozzles if any are worn
- Use a Syngenta Calibration Checker for quick results
- Check nozzle height is 50cm