Control flow valves, compression sprayers and a mix on demand system

are always pleased to e receive comments on any of our content. Prompted by correspondence following an article, in our December 2012 issue ('Indoor Residual Spraying', page 308) which featured the use of a control flow valve (CFV), we felt a follow up article would be in order to help address some of the questions raised. Professor Graham Matthews explains more.

Although the article featured indoor spraying, in treating for mosquitoes, the same principles of using a CFV apply to other users of compression sprayers and generally on other equipment, where the pressure is liable to change during a spray application. By using a CFV, the operator has a constant pressure at the nozzle that ensures the output remains the same during an application and also ensures that the droplet spectrum does not change.

Control flow valves are made by several manufacturers, but the preferred type has a fixed pressure setting that cannot be changed while spraying. One manufacturer has 4 colour coded CFVs; namely yellow (1 bar pressure), red (1.5 bar), blue (2 bar) and green (3 bar), so that the user can select the most suitable for a particular application. Generally the yellow CFV is designed for herbicide application, while the blue valve is most suited for fungicide application. The red valve is the most used as it provides a compromise between the 1 and 2 bar pressures. The green valve is less suited for use on a compression sprayer as the tank pressure has to be kept above 3 bar but it can be used where there is a mechanised pumping system. A major advantage of spraying at low pressure, is that the spray emits a much lower volume in very small droplets (<100µm) so the risk of inhaling spray is reduced



Spray rig on open deck truck fitted with CF Valves

in comparison with a spray applied at 4 bar pressure.

A range of compression sprayers are used by professional pest control companies to treat range of surfaces within buildings to control cockroaches and other pests. With all compression sprayers, the tank pressure decreases as the spray liquid is applied. Thus over time, the output of spray per minute decreases as the tank pressure drops and the droplets on average increase in size. The angle of spray from the nozzle will also decrease. By adding a CFV to the lance adjacent to the nozzle, the spray delivery remains at a constant rate until the tank pressure is insufficient to open

Calibration of a Sprayer:-

Flow rate (litres/minute)

[swath width (metres) x Speed of travel (m/min)

] = Volume application rate (I/m²)



Example range of CFV nozzles

the valve; the operator then knows the tank has to be re-pressurised.

Compression sprayers used by PCOs differ from those recommended by the World Health Organisation as they have a small tank opening in which the pump is fitted. The WHO specification for compression sprayers requires the pump to be separate from the tank lid, and provides a large tank opening to allow easy filling from a bucket. However the main reason for keeping the pump separate from the tank lid is to avoid taking out the pump each time the tank has to be re-filled. Removing the pump exposes the operator to spray liquid on the outside of the pump which is inevitably placed on a surface while re-filling, and this means any dirt on the surface can be put into the tank when refitting the pump. In campaigns to control mosquitoes in the tropics, the pump was often contaminated with soil which could subsequently block a nozzle.

Unfortunately compression sprayers do not have an agitator, so a particulate suspension (spray) inside the tank may settle out if the sprayer is left standing. Modern formulations have very small particles and are formulated to mix easily with water, so remain in suspension much better than earlier wettable powder formulations. Nevertheless, when the pump/lid has been fixed in place and the tank pressurised, it is important to shake the tank to ensure the spray liquid is well mixed before it is applied. A compression sprayer must not leak, otherwise it would not be possible to pressurise the tank, so there is no risk of spillage while shaking the tank.

The amount of water to use in a compression sprayer is dictated by its capacity, allowing for an airspace above the spray liquid. Thus users need to read the pesticide label carefully to ensure the correct spray concentration is achieved. Furthermore the operator should always have checked the flow rate with a CFV in place and calibrate the amount deposited on a surface knowing the speed of travel and swath width [see box]. While porous surfaces can be treated with >30 ml/m², it is better to keep the spray volume to 30ml/m² or less. Having too small a nozzle orifice increases the risk of a nozzle blockage.

Once a pesticide container has been emptied it should always be triple rinsed and the rinsates (liquid used for rinsing) added to the spray tank. Triple rinsing removes almost all pesticide on the inside of a container so that the empty container can be disposed or re-cycled







according to local regulations. This does not apply to water-soluble sachets.

Spray Mix on Demand

Some professional spray operators work from a truck, especially when treating roadsides and amenity areas, including golf courses. It is not always easy to determine how much spray should be prepared, so a means of diluting a concentrate with water as required is a welcome addition to their equipment. In the USA, an On-Demand System (MMOD) has a control flow valve (CFV) to regulate the pressure and flow rate of the active ingredient. By incorporating the CFV with a rotameter and needle valve, the user can set the desired flow rate with visual verification and once set, the CFV will automatically modulate any variations of the input pressure from the pump. The Modular Mix on Demand (MMOD) Single Line System has three options - one, two and three Actives can be used in any combination of the three actives to be applied at the rate set on each rotameter. The flow rate of the active ingredient mixing into the stream of water will be constant and accurate. Furthermore, because the active ingredient is being mixed on demand from concentrate there is no pre-mixing or disposal of unused chemicals, substantially reducing the exposure to the worker and the environment.

Distributors of the Control Flow Valve in the UK are Agratech, www.agratech. co.uk and ADH Baseline, www.adhbaseline.co.uk. It is understood that also Kilgerm will soon stock the valve.