

Station workers evaluate constant flow valves for backpack or tractor-mounted spraying

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Background

Some 27 years ago we developed a simple method of backpack spraying with single-nozzle wands to apply herbicide sprays precisely. It involves specified nozzle tips and a pressure gauge to assure constant nozzle output of either 0.3 or 0.5 gal/minute, depending on the nozzle chosen. (Copies of this method are available on request.) The system has been widely used, especially in Christmas trees and in ornamental nurseries. In recent years various pressure regulators and constant flow valves have become available and claim to make spraying with compression or backpack sprayers easier by providing constant nozzle output without having to watch a pressure gauge.

Our experience with one commercially available pressure regulating attachment was negative because of high initial cost and the time required to adjust the regulator and calibrate the sprayer. The

pressure gauge system seems hard to beat, both for simplicity and for precision. However, since there is no technology so good that it cannot be improved upon, we recently acquired and tested the constant flow "CFValve™" manufactured by G.A.T.E. LLC. This valve maintains constant nozzle output regardless of pressure and shuts off when system pressure drops below a specified minimum.

G.A.T.E. markets four CFValve models, delivering outputs at four different pressures ranging from 14.5 to 43.5 psi. All are specially designed for compression and lever-operated backpack sprayers. Since most commercial lever-operated backpack sprayers that we have tested can only comfortably develop outputs of between about 0.45 and 0.5 gal/minute, we chose the yellow, red, and blue CFValves with output pressures of 14.5, 21, and 29 psi, respectively.

Test Methods and Results

We ran triplicate tests with the CFValve installed on Solo 425 or 475 sprayers, measuring the output with several nozzle tips offered by Spraying Systems Co. and commonly used in Christmas tree and nursery situations. Tested nozzles included even-spray tips designed for band spraying over small trees (8003E and 8004E), off-center tips used for spraying from each side of a row (OC-03 and OC-04), flood-jet tips for spraying 4 to 7-ft swaths (TK-2 or TF-2, and TK-4 or TF-4) and the Field-jet tip for spraying 8 to 14-ft swaths (KLC-5). KLC-5 tips are commonly used for broadcast spraying in ornamental nursery stock. We then used the output data to compute gallons per acre applied at three walking speeds that are easily attained by growers. These data are shown in the following table. Variability of output in the three runs was very low, and well within the 1.5% claimed by G.A.T.E. With the higher output blue CFValve and certain tips, we found that hand pumping speeds were too high to comfortably maintain and the volume outputs were higher than needed. We consider use of these tips with the blue CFValve impractical and the corresponding data are not shown below. (continued on page 11)

Table. Nozzle output (measured) and spray volume (calculated) with G.A.T.E. CFValves and selected Spraying Systems Co. nozzle tips.

CFValve color ^a	Spraying Systems nozzle tip(s)	Desired swath width (ft)	Nozzle output (fl oz/min)	Gallons per sprayed acre at three walking speeds		
				3 ft/sec	4 ft/sec	4.5 ft/sec
Yellow	8003E or OC-03	2.0	24 (1½ pints)	22.8	17.1	15.2
Yellow	8003E or OC-03	3.0	24 (1½ pints)	15.2	11.4	10.1
Yellow	8004E or OC-04	2.0	32 (1 quart)	30.4	22.8	20.2
Yellow	8004E or OC-04	3.0	32 (1 quart)	20.2	15.2	13.5
Red	8003E or OC-03	2.0	28	26.6	20	17.7
Red	8003E or OC-03	3.0	28	17.7	13.3	11.8
Red	8004E or OC-04	2.0	38	36	27	24
Red	8004E or OC-04	3.0	38	24	18	16
Yellow	TK-2 or TF-2	4.0	30	14.3	10.7	9.5
Yellow	TK-2 or TF-2	6.0	30	9.5	7.1	6.3
Red	TK-2 or TF-2	6.0	36	11.3	8.5	7.5
Blue	TK-2 or TF-2	6.0	41	13	9.7	8.6
Yellow	TK-4 or TF-4	7.0	57	15.4	11.5	10.3
Yellow	KLC-5	8.0	64 (2 quarts)	15.2	11.4	10.1
Yellow	KLC-5	12.0	64 (2 quarts)	10.1	7.6	6.7
Yellow	KLC-5	14.0	64 (2 quarts)	8.7	6.5	5.8

^aYellow, red, and blue CFValves have output pressure rated at 14.5, 21, and 29 psi, respectively.

Station workers evaluate contact flow valves

(continued from page 10)

Spray volumes in the above table (i.e., Gallons per sprayed acre at three walking speeds) were obtained by plugging the variables of nozzle output, swath width, and walking speed into the following formula.

$$\frac{\text{Gallons per acre} = \text{Nozzle output in fl oz per minute} \times 5.7}{\text{Speed in ft per second} \times \text{swath width in ft}}$$

Note that with off-center (OC-03 or OC-04) nozzles, the swath width per nozzle is the total width covered by the two swaths divided by 2, ignoring the overlap in the center.

CFValves normally are installed near the end of the spray wand, just behind the nozzle cap and tip. A 25 or 50-mesh strainer should also be installed to prevent clogging of the tip.

CFValves are available in 11/16", 3/8", and 1/4" BSP threads as well as 18 mm threads. The 3/8" BSP fits Solo and Lesco wands and the 11/16" fits Spraying Systems wands. CFValves are available from several distributors and locally from OESCO Inc. in Conway, MA (1-800-634-5557). For names of other distributors or

other information you may call G.A.T.E. at 1-800-303-2099 or fax them at 772-388-3443. G.A.T.E.'s website at www.cfvalves.com has distributor and other information. CFValves currently cost about \$18.00 each.

CFValves should also work well on tractor-mounted sprayers. Separate check valves are not needed because the CFValve shuts off rapidly when line pressure drops below the minimum and they assure constant flow rates whenever line pressure is above that required to open the valve. They should be especially useful on tractor-mounted sprayers that have only one or two nozzles per row.

Calibrating a CFValve Equipped Sprayer

Use the above table only as a guide, and be sure to check the nozzle output of your sprayer, however it is equipped, measuring the nozzle output in fluid ounces per minute. If nozzle output does not agree with our figures in the table or if the other variables of speed and swath width differ from those we have selected, plug your specific values into the above formula to compute gallons per acre with

your system.

Maintaining constant speed is very important. To walk at 4 ft per second, for example, measure out 40 ft and practice walking it in 10 seconds. Tractor speed also should be checked, noting a throttle setting or RPM that can be repeated. Swath width is modified by choosing correct tip and by holding the nozzle at a height and angle that give the desired width. Remember that the desired amount of pesticide per treated acre is always added to the number of gallons of spray applied per acre or in the same proportion.

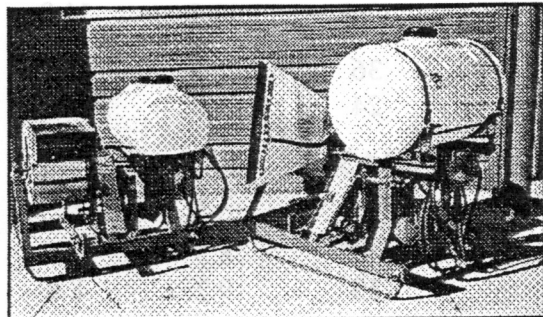
The big advantage of using a CFValve on a backpack sprayer is that you do not have to glance at a gauge while spraying. Similarly, training others to spray precisely could become more straightforward.

The bottom line: Experience is often one's best guide. If you and your employees like using a pressure gauge on your backpack and you've had good results, there may be no reason to change. However, the gaugeless, constant pressure output of the CFValve means one less thing to worry about while spraying and this could translate into greater accuracy and less operator fatigue under some circumstances. Christmas tree growers who spray herbicides down each row with tractor-mounted equipment also could find it advantageous to consider CFValves. ▲

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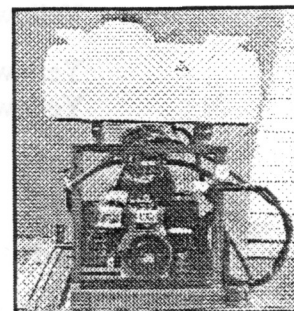
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