

Benefits of Using a PWM Spraying System

- Ensures proper dosage of chemicals, which fights weed species resistance to plant protection products.
- Pressure is independent of travel speed, so the droplet spectrum can be maintained throughout a spray job, even right up to the edge of the field.
- Prevents overlaps in spraying via more refined section control, or even individual nozzle control.
- Most PWM systems compensate for boom speed differences while turning. When turning in conventional sprayers, the outer boom is moving much faster than the sprayer, which results in under-dosing (promoting resistance), while the inner boom is traveling more slowly and putting out a much higher rate.

HOW TO SELECT A PWM NOZZLE UNDERSTANDING PWM CHARTS

PWM charts are very different from traditional flow rate tabulation charts. These charts show a speed range for operating a specific size nozzle at a given pressure. The target speed is highlighted at 75%, which indicates the duty cycle, or what percent of time the nozzle will be spraying. Spraying at 75% duty cycle will allow for speed changes and turn compensation.

Another important point is that nozzle pressure is different than the boom pressure in PWM systems. There is a pressure drop across the solenoid, and this needs to be considered when selecting a nozzle based on the droplet spectrum it produces at a given pressure. The droplet data on the charts provided here reflect the adjusted droplet spectrum, based on actual nozzle pressure, and not boom pressure.

A situation to watch for is larger nozzle sizes that push the limit of the solenoids, which control the pulsing of the nozzles. This can lead to very low pressures, where the nozzle is operating below its rated pressure range and will cause poor spray patternation. The 2.0 GPM (Size 20 nozzle) row on this chart shows the boom pressure at 30 PSI, but nozzle pressure is only at 12 PSI, too low to form a uniform spray pattern.

The process to select a nozzle is to start with the application rate needed, move down the 75% duty cycle column, and find a few options for your ideal speed. Look left to see the droplet spectrum ranges offered by the nozzles. Select optimal droplet spectrums for your applications. Very Coarse to Coarse is useful for avoiding drift in systemic applications. Coarse to Medium provides a good mix of coverage and drift control. Fine to Medium droplets are prone to drift, and should only be used for insecticides, fungicides, and contact products when conditions allow for this spray quality.

The optimal pressure for the nozzle depends on the nozzle type and the desired spray quality. SprayMax nozzles should be operated at the lowest pressure possible, as small increases in pressure reduce the droplet size and increase the drift potential. For BP, BPDF and SD nozzles, 40 to 70 psi will generally work best. Remember that larger nozzle sizes cause a greater pressure drop, and will require higher boom pressure to compensate.



NOZZLES FOR PWM SYSTEMS

SELECTION GUIDE



BLENDED PULSE™ DUALFAN NOZZLES THE FULL SEASON NOZZLE FOR PWM



Blended Pulse™ DualFan (BPDF) nozzles use the same asymmetric DualFan spray pattern as the proven TurboDrop Asymmetric DualFan (TADF) nozzle, bringing the best combination of drift control and coverage to PWM applications without the use of air-injection.

The BPDF is truly a multi-purpose nozzle, producing a Very Coarse to Coarse droplet spectrum at lower pressure for drift control in burndown applications, and Coarse to Medium Droplets at higher pressure, perfect for coverage critical applications like contact herbicides, fungicides, insecticides and more.

The DualFan spray pattern relieves coverage concerns associated with PWM nozzles pulsing on and off. As with the popular TADF nozzle, farmers can maximize coverage by alternating BPDF nozzles on the boom to provide four angles of spray into the canopy, effectively spraying the target four times in one pass.

Asymmetric DualFan spray pattern coupled with Medium to Coarse spray quality and low drift without air-injection make the Blended Pulse™ DualFan the most versatile nozzle for PWM applications.

BP Nozzle for Dual Solenoid Systems

The 110° flat fan Blended Pulse™ (BP) Nozzle can be used stand alone for lower rates, where a Very Coarse to Medium spray quality is desired, with glyphosate, for example.



It can also be used in combination with a BPDF in PWM systems with two solenoids per nozzle body, to expand the optimal operating range. For example, when pairing a BPDF06 with a BP03, the 03 can operate at lower speeds and application rates, the 06 can be used when speeds/rates pick up, and finally both can be combined to reach an 09 size for the highest speeds and application rates.

BPDF Sizes: 03, 04, 05, 06, 07, 08, 09, 10, 12 / BP Sizes: 015, 02, 03, 04, 05, 06

SOFTDROP ULTRA COARSE NOZZLES ULTRA COARSE NOZZLE FOR PWM



The SoftDrop nozzle is a non-air inducted spray nozzle designed to produce Extremely Coarse and Ultra Coarse droplets for maximum drift control with dicamba, 2,4-D, glyphosate, and other systemic products applied by PWM equipped spray rigs. SoftDrop nozzles are also excellent for liquid fertilizers and mixtures of liquid fertilizers and herbicides.

Approved nozzles, pressures, and application rates change often for auxin herbicides. For updates on Greenleaf Technologies approved nozzles, please visit our website. All approved nozzles are listed on the herbicide manufacturer's label. Be sure to read the application guidelines and know the laws in your state before spraying.

Sizes: 04, 05, 06, 08, 10

OVER TWENTY FIVE YEARS OF NOZZLE INNOVATION

Greenleaf Technologies has been serving farmers and professional applicators in the United States and Canada from our headquarters in southeast Louisiana for over 25 years. We pride ourselves in providing innovations in spray technologies that bring success to our customers.

The TurboDrop and AirMix line of air-injected nozzles are well known, including the popular TurboDrop Asymmetric DualFan Nozzles(TADF).

The TADF has proven to be one of the most versatile nozzles available, making it a full season nozzle for many farmers due to its unique combination of spray coverage, canopy penetration and drift control. Through the use of an alternating configuration on the spray boom the DualFan pattern effectively sprays the target four times in one pass.

With the introduction of our Blended Pulse™ DualFan nozzles we can bring this level of flexibility to the growing number of farmers using PWM systems. Blended Pulse™ DualFan nozzles produce Very Coarse to Coarse Droplets at lower pressure for better drift control in burndown applications, and Coarse to Medium Droplets at higher pressures in coverage critical applications like contact herbicides, fungicides and insecticides.

For specialty applications we have a full line of nozzles for PWM applications. This includes the SprayMax DualFan which produces a Medium to Fine droplet spectrum for contact critical applications and the SoftDrop nozzle for Ultra Coarse drift control. These new nozzles achieve this wide range of droplet spectrum all without the use of air-injection.

Nozzle Compatibility with PWM Systems

All SprayMax, SprayMax DualFan, SoftDrop, Blended Pulse™, and Blended Pulse™ DualFan Greenleaf Technologies PWM nozzles have been designated for use with PWM systems such as Aim Command™, Capstan Synchro™, Raven Hawkeye™, or John Deere ExactApply™ and other PWM spraying systems.

SPRAYMAX DUALFAN NOZZLES ULTIMATE IN COVERAGE FOR PWM



The SprayMax DualFan Nozzle is a non-air injected nozzle that employs conventional flat fan tips in an asymmetric dual cap. The dual tips are oriented 10° forward and 50° rearward to provide a combination of penetration and backside coverage in complex canopies.

To maximize coverage, the nozzles may be alternated on the boom to provide four angles of spray orientation into the canopy, effectively spraying the target four times in one pass. The Medium to Fine droplet spectrum coupled with the asymmetric DualFan spray pattern of the SprayMax DualFan makes it an exceptional nozzle for fungicide, insecticide, and other contact critical broadcast applications.

Sizes: 02, 025, 03, 04, 045, 05, 055, 06, 065, 07, 075, 08, 09, 10, 12, 14, 16, 18, 20, 30

High Flow PWM Valve Speed Range (MPH) - 20" Spacing

Tip Size	Gauge (PSI)	Nozzle (PSI)	BPDF	BP	SD	DF	TCP	7.5 GPA				10 GPA				12.5 GPA				15 GPA				20 GPA				25 GPA							
								Min		Max		Min		Max		Min		Max		Min		Max		Min		Max		Min		Max		Min		Max	
								25%	50%	75%	100%	25%	50%	75%	100%	25%	50%	75%	100%	25%	50%	75%	100%	25%	50%	75%	100%	25%	50%	75%	100%	25%	50%	75%	100%
0.3 GPM #3	20	20	C	VC		F	F	2	4	6	8	2	3	5	6	1	2	4	5	1	2	3	4	1	2	2	3	1	1	2	2				
	30	30	M	VC		F	F	3	5	8	10	2	4	6	8	2	3	5	6	1	3	4	5	1	2	3	4	1	2	2	3				
	40	39	M	C		F	F	3	6	9	12	2	4	7	9	2	4	5	7	1	3	4	6	1	2	3	4	1	2	3	4				
	50	49	F	C		F	F	3	7	10	13	2	5	7	10	2	4	6	8	2	3	5	7	1	2	4	5	1	2	3	4				
	60	59	F	M		F	F	4	7	11	14	3	5	8	11	2	4	6	9	2	4	5	7	1	3	4	5	1	2	3	4				
0.4 GPM #4	20	19	C	VC	UC	F	F	3	5	8	11	2	4	6	8	2	3	5	7	1	3	4	5	1	2	3	4	1	2	3	5				
	30	29	C	VC	UC	F	F	3	7	10	13	3	5	8	10	2	4	6	8	2	3	5	7	1	3	4	5	1	2	3	4				
	40	39	M	C	XC	F	F	4	8	12	15	3	6	9	12	2	5	7	9	2	4	6	8	1	3	4	6	1	2	3	5				
	50	49	M	C	XC	F	F	4	9	13	17	3	6	10	13	2	5	8	10	2	4	6	9	2	3	5	6	1	3	4	5				
	60	58	F	M	XC	F	F	5	9	14	19	4	7	11	14	3	6	8	11	2	5	7	9	2	4	5	7	1	3	4	6				
0.5 GPM #5	20	19	VC	XC	UC	F	M	3	7	10	13	3	5	8	10	2	4	6	8	2	3	5	7	1	3	4	5	1	2	3	4				
	30	29	C	VC	UC	F	F	4	8	12	16	3	6	9	12	2	5	7	10	2	4	6	8	2	3	5	6	1	2	4	5				
	40	38	C	C	XC	F	F	5	9	14	19	4	7	11	14	3	6	9	11	2	5	7	9	2	4	5	7	1	3	4	6				
	50	48	M	C	XC	F	F	5	11	16	21	4	8	12	16	3	6	10	13	3	5	8	11	2	4	6	8	2	3	5	6				
	60	58	M	C	XC	F	F	6	12	17	23	4	9	13	17	3	7	10	14	3	6	9	12	2	4	7	9	2	3	5	7				
0.6 GPM #6	20	19	XC	XC	UC	F	M	4	8	12	16	3	6	9	12	2	5	7	9	2	4	6	8	1	3	4	6	1	2	4	5				
	30	28	VC	VC	UC	F	M	5	10	15	19	4	7	11	15	3	6	9	12	2	5	7	10	2	4	5	7	1	3	4	6				
	40	38	C	VC	XC	F	F	6	11	17	22	4	8	13	17	3	7	10	13	3	6	8	11	2	4	6	8	2	3	5	7				
	50	47	C	C	XC	F	F	6	13	19	25	5	9	14	19	4	8	11	15	3	6	9	13	2	5	7	9	2	4	6	8				
	60	56	M	C	XC	F	F	7	14	21	27	5	10	15	21	4	8	12	16	3	7	10	14	3	5	8	10	2	4	6	8				
0.7 GPM #7	20	18	XC			F		5	9	14	18	3	7	10	14	3	5	8	11	2	5	7	9	2	3	5	7	1	3	4	5				
	30	28	VC			F		6	11	17	22	4	8	12	17	3	7	10	13	3	6	8	11	2	4	6	8	2	3	5	7				
	40	37	C			F		6	13	19	26	5	10	14	19	4	8	11	15	3	6	10	13	2	5	7	10	2	4	6	8				
	50	46	C			F		7	14	21	29	5	11	16	21	4	9	13	17	4	7	11	14	3	5	8	10	2	4	6	9				
	60	55	C			F		8	16	23	31	6	12	18	23	5	9	14	19	4	8	12	16	3	6	9	12	2	5	7	9				
0.8 GPM #8	20	18	XC		UC	M	M	5	10	15	20	4	8	11	15	3	6	9	12	3	5	8	10	2	4	6	8	2	3	5	6				
	30	27	VC		UC	F	M	6	12	19	25	5	9	14	19	4	7	11	15	3	6	9	12	2	5	7	9	2	4	6	7				
	40	36	C		XC	F	M	7	14	21	29	5	11	16	21	4	9	13	17	4	7	11	14	3	5	8	10	2	4	6	9				
	50	45	C		XC	F	F	8	16	24	32	6	12	18	24	5	10	14	19	4	8	12	16	3	6	9	12	2	5	7	10				
	60	54	C		XC	F	F	9	17	26	35	7	13	20	26	5	10	16	21	4	9	13	17	3	7	10	13	3	5	8	10				
0.9 GPM #9	20	18	XC			M		6	11	17	22	4	8	12	17	3	7	10	13	3	6	8	11	2	4	6	8	2	3	5	7				
	30	26	VC			F		7	14	20	27	5	10	15	20	4	8	12	16	3	7	10	14	3	5	8	10	2	4	6	8				
	40	35	VC			F		8	16	23	31	6	12	18	23	5	9	14	19	4	8	12	16	3	6	9	12	2	5	7	10				
	50	44	C			F		9	17	26	35	7	13	20	26	5	10	16	21	4	9	13	17	3	7	10	13	3	5	8	11				
	60	53	C			F		10	19	29	38	7	14	22	29	6	11	17	23	5	10	14	19	4	7	11	14	3	6	9	12				
1.0 GPM #10	20	17	XC		UC	M	VC	6	12	18	24	4	9	13	18	4	7	11	14	3	6	9	12	2	4	7	9	2	4	6	7				
	30	26	VC		UC	F	C	7	15	22	29	5	11	16	22	4	9	13	18	4	7	11	15	3	5	8	10	2	5	7	9				
	40	34	VC		UC	F	M	8	17	25	34	6	13	19	25	5	10	15	20	4	8	13	17	3	6	9	13	3	5	8	11				
	50	43	C		UC	F	M	9	19	28	38	7	14	21	28	6	11	17	23	5	9	14	19	4	7	11	14	3	6	9	12				
	60	51	C		UC	F	M	10	21	31	41	8	16	23	31	6	12	19	25	5	10	16	21	4	8	12	16	3	6	10	13				
1.2 GPM #12	20	16	XC			M	VC	7	13	20	27	5	10	15	20	4	8	12	16	3	7	10	13	3	5	8	10	2	4	6	8				
	30	24	VC			M	C	8	16	25	33	6	12	19	25	5	10	15	20	4	8	12	16	3	6	9	12	3	5	8	10				
	40	32	VC			F	C	10	19	29	38	7	14	21	29	6	11	17	23	5	10	14	19	4	7	11	14	3	6	9	12				
	50	40	C			F	M	11	21	32	43	8	16	24	32	6	13	19	26	5	11	16	21	4	8	12	16	3	7	10	13				
	60	48	C			F	M	12	23	35	47	9	17	26	35	7	14	21	28	6	12	17	23	4	9	13	17	4	7	11	15				
1.4 GPM #14	20	15				C		7	15	22	29	5	11	16	22	4	9	13	18	4	7	11	15	3	5	8	10	2	5	7	9				
	30	22				M		9	18	27	36	7	13	20	27	5	11	16	22	4	9	13	18	3	7	10	13	3	6	8	11				
	40	30				M		10	21	31	41	8	16	23	31	6	12	19	25	5	10	16	21	4	8	12	16	3	6	10	13				
	50	37				F		12	23	35	46	9	17	26	35	7	14	21	28	6	12	17	23	4	9	13	17	4	7	11	14				
	60	45				F		13	25	38	51	10	19	29	38	8	15	23	30	6	13	19	25	5	10	14	19	4	8	12	16				
1.6 GPM #16	20	14				--	--																												

High Flow PWM Valve Speed Range (MPH) - 15" Spacing

Tip Size	Gauge (PSI)	Nozzle (PSI)	BPDF	BP	SD	DF	TCP	7.5 GPA				10 GPA				12.5 GPA				15 GPA				20 GPA				25 GPA							
								Min		Max		Min		Max		Min		Max		Min		Max		Min		Max		Min		Max		Min		Max	
								25%	50%	75%	100%	25%	50%	75%	100%	25%	50%	75%	100%	25%	50%	75%	100%	25%	50%	75%	100%	25%	50%	75%	100%	25%	50%	75%	100%
0.3 GPM #3	20	20	C	VC		F	F		3	6	8	11	2	4	6	8	2	3	5	7	1	3	4	6	1	2	3	4	1	2	2	3			
	30	30	M	VC		F	F		3	7	10	14	3	5	8	10	2	4	6	8	2	3	5	7	1	3	4	5	1	2	3	4			
	40	39	M	C		F	F		4	8	12	16	3	6	9	12	2	5	7	9	2	4	6	8	1	3	4	6	1	2	4	5			
	50	49	F	C		F	F		4	9	13	17	3	7	10	13	3	5	8	10	2	4	7	9	2	3	5	7	1	3	4	5			
	60	59	F	M		F	F		5	10	14	19	4	7	11	14	3	6	9	11	2	5	7	10	2	4	5	7	1	3	4	6			
0.4 GPM #4	20	19	C	VC	UC	F	F		4	7	11	15	3	5	8	11	2	4	7	9	2	4	5	7	1	3	4	5	1	2	3	4			
	30	29	C	VC	UC	F	F		4	9	13	18	3	7	10	13	3	5	8	11	2	4	7	9	2	3	5	7	1	3	4	5			
	40	39	M	C	XC	F	F		5	10	15	21	4	8	12	15	3	6	9	12	3	5	8	10	2	4	6	8	2	3	5	6			
	50	49	M	C	XC	F	F		6	11	17	23	4	9	13	17	3	7	10	14	3	6	9	11	2	4	6	9	2	3	5	7			
	60	58	F	M	XC	F	F		6	13	19	25	5	9	14	19	4	8	11	15	3	6	9	13	2	5	7	9	2	4	6	8			
0.5 GPM #5	20	19	VC	XC	UC	F	M		4	9	13	18	3	7	10	13	3	5	8	11	2	4	7	9	2	3	5	7	1	3	4	5			
	30	29	C	VC	UC	F	F		5	11	16	22	4	8	12	16	3	7	10	13	3	5	8	11	2	4	6	8	2	3	5	7			
	40	38	C	C	XC	F	F		6	13	19	25	5	9	14	19	4	8	11	15	3	6	9	13	2	5	7	9	2	4	6	8			
	50	48	M	C	XC	F	F		7	14	21	28	5	11	16	21	4	8	13	17	4	7	11	14	3	5	8	11	2	4	6	8			
	60	58	M	C	XC	F	F		8	15	23	31	6	12	17	23	5	9	14	19	4	8	12	15	3	6	9	12	2	5	7	9			
0.6 GPM #6	20	19	VC	XC	UC	F	M		5	11	16	21	4	8	12	16	3	6	9	13	3	5	8	11	2	4	6	8	2	3	5	6			
	30	28	VC	VC	UC	F	M		6	13	19	26	5	10	15	19	4	8	12	15	3	6	10	13	2	5	7	10	2	4	6	8			
	40	38	C	VC	XC	F	F		7	15	22	30	6	11	17	22	4	9	13	18	4	7	11	15	3	6	8	11	2	4	7	9			
	50	47	C	C	XC	F	F		8	17	25	33	6	13	19	25	5	10	15	20	4	8	13	17	3	6	9	13	3	5	8	10			
	60	56	M	C	XC	F	F		9	18	27	37	7	14	21	27	5	11	16	22	5	9	14	18	3	7	10	14	3	5	8	11			
0.7 GPM #7	20	18	XC			F			6	12	18	24	5	9	14	18	4	7	11	14	3	6	9	12	2	5	7	9	2	4	5	7			
	30	28	VC			F			7	15	22	30	6	11	17	22	4	9	13	18	4	7	11	15	3	6	8	11	2	4	7	9			
	40	37	C			F			9	17	26	34	6	13	19	26	5	10	15	20	4	9	13	17	3	6	10	13	3	5	8	10			
	50	46	C			F			10	19	29	38	7	14	21	29	6	11	17	23	5	10	14	19	4	7	11	14	3	6	9	11			
	60	55	C			F			10	21	31	42	8	16	23	31	6	13	19	25	5	10	16	21	4	8	12	16	3	6	9	13			
0.8 GPM #8	20	18	XC		UC	M	M		7	13	20	27	5	10	15	20	4	8	12	16	3	7	10	13	3	5	8	10	2	4	6	8			
	30	27	VC		UC	F	M		8	16	25	33	6	12	19	25	5	10	15	20	4	8	12	16	3	6	9	12	2	5	7	10			
	40	36	C		XC	F	M		10	19	29	38	7	14	21	29	6	11	17	23	5	10	14	19	4	7	11	14	3	6	9	11			
	50	45	C		XC	F	F		11	21	32	43	8	16	24	32	6	13	19	26	5	11	16	21	4	8	12	16	3	6	10	13			
	60	54	C		XC	F	F		12	23	35	47	9	17	26	35	7	14	21	28	6	12	17	23	4	9	13	17	3	7	10	14			
0.9 GPM #9	20	18	XC			M			7	15	22	29	6	11	17	22	4	9	13	18	4	7	11	15	3	6	8	11	1	3	4	6			
	30	26	VC			F			9	18	27	36	7	14	20	27	5	11	16	22	5	9	14	18	3	7	10	14	2	3	5	7			
	40	35	VC			F			10	21	31	42	8	16	23	31	6	13	19	25	5	10	16	21	4	8	12	16	2	4	6	8			
	50	44	C			F			12	23	35	47	9	17	26	35	7	14	21	28	6	12	17	23	4	9	13	17	2	4	7	9			
	60	53	C			F			13	26	38	51	10	19	29	38	8	15	23	31	6	13	19	26	5	10	14	19	2	5	7	10			
1.0 GPM #10	20	17	XC		UC	M	VC		8	16	24	32	6	12	18	24	5	10	14	19	4	8	12	16	3	6	9	12	1	3	5	8			
	30	26	VC		UC	F	C		10	19	29	39	7	15	22	29	6	12	18	23	5	10	15	19	4	7	11	15	2	4	5	7			
	40	34	VC		UC	F	M		11	23	34	45	8	17	25	34	7	14	20	27	6	11	17	23	4	8	13	17	2	4	6	8			
	50	43	C		UC	F	M		13	25	38	50	9	19	28	38	8	15	23	30	6	13	19	25	5	9	14	19	2	5	7	9			
	60	51	C		UC	F	M		14	28	41	55	10	21	31	41	8	17	25	33	7	14	21	28	5	10	16	21	3	5	8	10			
1.2 GPM #12	20	16	XC			M	VC		9	18	27	36	7	13	20	27	5	11	16	22	4	9	13	18	3	7	10	13	2	3	5	7			
	30	24	XC			M	C		11	22	33	44	8	16	25	33	7	13	20	26	5	11	16	22	4	8	12	16	2	4	6	8			
	40	32	VC			F	C		13	25	38	51	10	19	29	38	8	15	23	30	6	13	19	25	5	10	14	19	2	5	7	10			
	50	40	C			F	M		14	28	43	57	11	21	32	43	9	17	26	34	7	14	21	28	5	11	16	21	3	5	8	11			
	60	48	C			F	M		16	31	47	62	12	23	35	47	9	19	28	37	8	16	23	31	6	12	17	23	3	6	9	12			
1.4 GPM #14	20	15				C			10	20	29	39	7	15	22	29	6	12	18	23	5	10	15	20	4	7	11	15	3	6	9	12			
	30	22				M			12	24	36	48	9	18	27	36	7	14	22	29	6	12	18	24	4	9	13	18	4	7	11	15			
	40	30				M			14	28	41	55	10	21	31	41	8	17	25	33	7	14	21	28	5	10	16	21	4	9	13	17			
	50	37				F			15	31	46	62	12	23	35	46	9	19	28	37	8	1													