Nozzle Technologies for Effective Weed Control. Robert E. Wolf, Wolf Consulting & Research, LLC.

The selection of the proper nozzle to correctly apply crop protection and other pesticide products is becoming a more challenging process. During recent times, nozzle manufacturers have designed nozzles for the purpose of reducing spray drift. Typically, the designs have incorporated chambers, preorifices, and venturi sections to reduce pressure internally and induce air-inclusion, which will aid in the minimization of the development of small drift-prone spray droplets.

Choosing nozzles for spray drift reduction in a ground application poses several challenges for the applicator based on needs for efficacy and environmental safety. A single nozzle type produces a very different droplet spectrum depending on the design, orifice size, and pressure used with the nozzle. Applicators choose different orifice sizes and pressures depending on the speed they want to travel in the field and the spray rate they need to apply. The consideration of each of these factors changes if growers are applying a contact pesticide versus a systemic one. The challenge of reducing drift with contact pesticides is to find nozzles that reduce drift while still maintaining a small enough droplet size to obtain acceptable efficacy. This is especially true as we are entering an era where resistant and hard-to-kill weeds are becoming more prevalent.

The following table has been prepared as a summary of the nozzles discussed in this presentation.

Basic Modern Era (1980-present) Nozzle Designs for Boom Sprayers					
Nozzle Type	Company	Design feature*	Recommended use	Suggested PSI**	Comments**
Extended Range (XR)	All	Standard orifice	Not recommended	If used, 15-25 psi	Too much drift potential
Turbo TeeJet (single- TT or twin orifice- TTJ60)	TeeJet only	Preorifice and chamber	For coverage products	30-40 psi	Excellent for coverage with herbicides, fungicides, and insecticides
Low Pressure Venturi – AIXR, GA, AirMix	All	Preorifice, chamber, and air-injection inlets	For coverage and systemic products	40-50 psi	Better drift control than TT, but less than High Pressure venturi designs
High Pressure Venturi – AI, TDXL, ULD	All	Preorifice, chamber, and air inlets	Best for systemic products	50-80 psi or higher	Good option for drift reduction, but requires the higher psi for coverage & pattern
High Pressure Venturi - TTI	TeeJet	Preorifice, chamber, and air inlets	Best for systemic products	50-80 psi or higher	Best option for drift control. Also requires higher psi
Boomless Nozzle Options:					
Boom Buster	EverGreen (various distributors)	Single outlet	Roadside, pastures, 4-wheelers	30- 60 psi	Pattern width and coverage limited by pressure and wind direction
Boom Extender	Hypro and Greenleaf	Single outlet			
XP BoomJet	TeeJet	Single outlet			

*All boom nozzle designs listed are flat-fan with tapered edge patterns (heavy middles - lighter edges, not even) requiring 25-30% overlap on each edge to maintain a uniform application. Some of the types listed are available with even patterns for band applications. Also, please observe the 1:1 ratio of boom height above target to nozzle spacing on the boom (20-inch spacing = 20-inches above the target). Lower booms equals less drift potential.

**Based on authors experience and research for optimum efficacy and drift mitigation.