THE EFFECT OF NOZZLE TYPE AND PRESSURE ON POSTEMERGENCE WEED CONTROL. Robert E. Wolf and Dallas E. Peterson, Associate Professor and Extension Specialist, Biological and Agricultural Engineering, and Professor, Department of Agronomy, Kansas State University, Manhattan, KS 66506.

This study was conducted to evaluate herbicide efficacy comparing a conventional nozzle, two venturi type nozzles, a third nozzle designed to reduce drift while maintaining adequate efficacy, and the new VariTarget nozzle designed for use in variable rate application scenarios. The experiment included comparisons of a chamber style nozzle, the turbo flat-fan from Spraying Systems (TT); a venturi style, the AirMix from Greenleaf (AM); the Ultra LoDrift from Hypro (ULD), also a venturi style; the new design in 2005, a turbo-venturi combination, the turbo flat-fan induction also from Spraying Systems (TTI), and the VariTarget from Delavan Ag Spray (VT). Orifice size and operating pressure for each nozzle treatment were selected to deliver a spray volume of 94 L/ha at 9.6 km/h while maintaining a similar droplet size within the pressure range. With the VariTarget nozzle, the basic nozzle body remains the same while the spray cap is exchanged to affect the droplet spectra. For this experiment, all the nozzles were tested at a low pressure (276 kPa) and a high pressure (483 kPa). The flow rates were attained by selecting the following orifice sizes: TT11002, AM11002, ULD120015, and TTI110015. For the VariTarget, the black/blue (coarse droplets) and clear/yellow (medium droplets) caps were exchanged to match the droplets to the other four nozzles at the calibrated flow rate at 172 kPa. The applications were made with a tractor-mounted 3-point sprayer equipped with a 4-nozzle boom. Nozzles were spaced at 51 cm and located 51 cm above the target. Glyphosate at 0.17 kg ae/ha and paraquat at 0.25 kg ai/ha were used to compare efficacy on large crabgrass, ivyleaf morningglory, velvetleaf, common sunflower, sorghum, and corn. Sublethal herbicide rates were used to accentuate efficacy differences. Ammonium sulfate at 2% w/w was added to the glyphosate treatments and NIS at 0.25% v/v was added to the paraquat treatments. The experiment had a randomized complete block design in a split plot arrangement with herbicide as the main plot and spray tip by pressure as the subplot. Treatments were replicated three times and efficacy was evaluated 28 days after treatment.

Efficacy ratings show that very few significant differences and interactions were found among herbicide and nozzle variables. Species control varied between glyphosate and paraquat as would be expected. Glyphosate provided better control of corn, sorghum, and large crabgrass compared to paraquat, and was similarly poor for ivyleaf morningglory to slightly less than paraquat for sunflower control. Paraquat had significantly better control for the velvetleaf treatments. With glyphosate, the AM, TTI, and ULD were significantly better than the TT and VT at 276 kPa for sorghum control, but at 483 kPa, only the ULD was significantly less than the other spray tips. No other glyphosate and nozzle comparisons were significantly different for any species. With paraquat, the TT and AM at 276 kPa had significantly better velvetleaf control than the TTI, VT, and ULD. At 483 kPa, the AM, TT, and the ULD were all significantly better than the VT and TTI. No other species, nozzle type, and pressure interactions with paraquat were significantly different.

Several significant differences among nozzle and pressure treatments were found when compared across chemical for all species. Sunflower control was best overall in the nozzle comparisons with ivyleaf morningglory control the lowest of the species compared. Significant differences were found among nozzle and pressure treatments. In many of the comparisons, lower pressures tended to out perform the higher pressure treatments. Specific knowledge about the chemical, species, nozzle, and pressure parameters and the interactions are critical for maximum efficacy.

Glysophate by Nozzle Interaction at 28 DAT:												
Glysophate	**Lacg**		**Ilmg**		**Vele**		**Sorg**		**Corn**		**Cosf**	
Pressure	**276**	**483**	**276**	**483**	**276**	**483**	**276**	**483**	**276**	**483**	**276**	**483**
TT	53	62	17	17	27	25	73[b]	77[a]	75	82	58	65
AM	60	58	23	13	27	25	82[a]	77[a]	83	83	62	63
TTI	63	60	23	13	32	28	83[a]	70[a]	82	70	77	68
ULD	60	50	20	17	33	27	75[a]	67[b]	73	68	67	63
VT – black/blue*	63	50	17	17	25	27	67[b]	70[a]	63	73	57	53
	NS		NS		NS		LSD=9		NS		NS	

*Blue represents a coarse (276 kPa) and Black a medium droplet spectrum (483 kPa).

Paraquat by Nozzle Interaction at 28 DAT:												
Paraquat	**Lacg**		**Ilmg**		**Vele**		**Sorg**		**Corn**		**Cosf**	
Pressure	**276**	**483**	**276**	**483**	**276**	**483**	**276**	**483**	**276**	**483**	**276**	**483**
TT	27	30	13	17	75[a]	80[a]	2	3	20	27	83	77
AM	43	40	20	17	77[a]	82[a]	3	3	23	23	88	83
TTI	43	33	17	13	63[b]	60[c]	3	3	30	20	85	75
ULD	33	33	17	13	63[b]	73[a]	2	3	30	30	82	80
VT – black/blue	40	27	13	13	60[b]	67[b]	5	2	23	20	83	70
	NS		NS		LSD=10		NS		NS		NS	

*Blue represents a coarse (276 kPa) and Black a medium droplet spectrum (483 kPa).

Chemical across Nozzle at 28 DAT:						
	Lacg	**Ilmg**	**Vele**	**Sorg**	**Corn**	**Cosf**
Glyphosate	58[a]	18	28[b]	74[a]	75[a]	63
Paraquat	35[b]	15	70[a]	3[b]	25[b]	81
	LSD=28	NS	LSD=11	LSD=9	LSD=16	NS

Nozzle across Chemical at 28 DAT:												
	Lacg		**Ilmg**		**Vele**		**Sorg**		**Corn**		**Cosf**	
Pressure	**276**	**483**	**276**	**483**	**276**	**483**	**276**	**483**	**276**	**483**	**276**	**483**
TT	40[b]	46[a]	15[b]	17	51[a]	53[a]	38[a]	40	48[b]	54[a]	71[b]	71[a]
AM	52[a]	49[a]	22[a]	15	52[a]	53[a]	43[a]	40	53[a]	53[a]	75[a]	73[a]
TTI	53[a]	47[a]	20[a]	13	48[a]	44[b]	43[a]	37	56[a]	45[b]	81[a]	72[a]
ULD	47[a]	42[a]	18[a]	15	48[a]	50[a]	38[a]	35	52[a]	49[a]	74[a]	72[a]
VT – black/blue	52[a]	38[b]	15[b]	15	43[b]	47[a]	36[b]	36	43[b]	47[a]	70[b]	62[b]
	LSD=11		LSD=5		LSD=7		LSD=6		LSD=8		LSD=9	

*Blue represents a coarse (276 kPa) and Black a medium droplet spectrum (483 kPa).