

AE 340 Laboratory 5. Sprayer Testing

A series of different sprayer nozzles will be tested to determine the effect of nozzle type and system pressure on the spray distribution and droplet size.

The following nozzles will be tested:

- a) Teejet 8004VS Even Flat Fan Spray Tips
- b) Teejet XR8004 Extended Range Even Flat Fan Spray Tips
- c) Teejet DG8004 Drift Guard Flat Fan Spray Tips
- d) Teejet AI11004VS Air induction Spray Tip
- e) Teejet TT11004 Turbo Teejet Flat Spray Tip

**Spray Distribution Testing:**

1) Place a Teejet 8004VS Spray in test stand and measure the height of the nozzle from the collection table. Vary the system pressure from 10-60 psi in 10 psi steps. For each pressure measure, the distribution pattern the single nozzle. Continue the spray test until the highest column height is at least 50% of the maximum column height and record the time taken. Repeat this test with the Teejet XR8004 Extended Range Even Flat Fan Spray Tips.

Teejet 8004VS Flat Fan Spray Tips

System Pressure (kPa)	Time (s)	Collection Volume Height																						
		11	19	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	10	11
10																								
20																								
30																								
40																								
50																								
60																								

Teejet XR8004VS Extended Range Flat Fan Spray Tips

System Pressure (kPa)	Time (s)	Collection Volume Height																						
		11	19	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	10	11
10																								
20																								
30																								
40																								
50																								
60																								

a) Plot the distribution curve for each nozzle and determine the CV for the nozzle. (Convert all data to an application rate.

2) Place three Teejet 8004VS Spray in test stand. Vary the system pressure from 10-60 psi in 10 psi steps. For each pressure measure, the distribution pattern the combined nozzle. Continue the spray test until the highest column height is at least 50% of the maximum column height and record the time taken. Repeat this test with the Teejet XR8004 Extended Range Even Flat Fan Spray Tips.

Teejet 8004VS Flat Fan Spray Tips

System Pressure (kPa)	Time (s)	Collection Volume Height																						
		11	19	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	10	11
10																								
20																								
30																								
40																								
50																								
60																								

Teejet XR8004VS Extended Range Flat Fan Spray Tips

System Pressure (kPa)	Time (s)	Collection Volume Height																						
		11	19	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	10	11
10																								
20																								
30																								
40																								
50																								
60																								

- a) Plot the combine distribution curve or each nozzle and determine the CV for the combined nozzles for a single nozzle spacing. Convert all data to an application rate. Include on the plot a distribution curves developed from overlapping the single distribution measurements.
- b) Comment on the differences between the measured and combined distribution curves.
- c) Explain any difference between the standard and extended range flat fan nozzles and in particular the effect of pressure on the distribution pattern.

3) Place a Standard 8004VS Even Flat Fan Spray Tips, Extended Range XR8004 Even Flat Fan Spray Tips and an Drift Guard DG8004 Flat Fan Spray Tips in the test stand. Vary the system pressure from 10-90 psi in 10 psi steps. Note the different droplet size. Replace these with Standard 8004VS Even Flat Fan Spray Tips, Teejet AI11004VS Air induction Spray Tip, Teejet TT11004 Turbo Teejet Flat Spray Tip and repeat the test.

Pressure (kPa)	Subjective Droplet Size				
	Standard Flat Fan 8004VS	Extended Range XR8004	Drift Guard DG8004	Air induction AI11004VS	Turbo Teejet TT11004
10					
20					
30					
40					
50					
60					
70					
80					
90					

a) Comment on the differences in droplet size for each nozzle, and the sensitivity of each type to pressure.

4) Place a Teejet XR8004VS extended range nozzle in test stand and measure the height of the nozzle from the collection table. Vary the system pressure from 10-90 psi (if possible) in 10 psi steps. Measure the time taken to fill a container of known volume.

Pressure (kPa)	Flowrate Measurement	
	Time (sec)	Volume
10		
20		
30		
40		
50		
60		
70		
80		
90		

a) Determine the range of pressure at which the nozzles follow the theoretical relationship between flow rate and pressure. i.e.  $Q_1/Q_2 = \text{square root}(P_1/P_2)$