

TSM 330 Laboratory 6. Fertilizer Spreading

Physical properties of fertilizer play an important role in the design of the spreader and also during the spreading of fertilizer. The motion of fertilizer particles on the disc of a spreader is affected by the coefficient of friction between fertilizer particles and disc and vane. Further, design parameters of the disc (rotational velocity, diameter of the disc, cone angle of the disc, feeding position, and pitch angle of the vane) are important. For the motion through the air fertilizer properties as particle density, particle size and particle shape are important besides the initial velocity of the particles and the initial discharge height.

The object of the lab is to measure spread patterns and measure the CV a single pass and multiple pass spread patterns.

A fertilizer spreader is tested according to ASABE Standards. S341.3. Collection pans are spread on one meter intervals across the path of a fertilizer spreader for 10 meters on each side of the spreader. Each collection tin is 30cmx30cm (1 ft) square. The table below shows the spread pattern for two different operational conditions. The zero column is the center of the spreader truck.

Spreader Collection Pattern

Test	Mass of Material in Collection Pan (g)																				
	10	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	10
A	0	0	0	1	2	3	4	5	5.5	6	6	6	5.5	5	4	3	2	1	0	0	0
B	0	1	2	3	4	5	6	6	5	4	3	2	1	1	0	0	0	0	0	0	0

For each test condition (A, B) determine the following information

- 1) The mean application rate, standard deviation and co-efficient of variability for a single pass of the spreader across the actual spread width (i.e. width of non zero collection pans)
- 2) Determine the spread pattern, mean application rate and co-efficient of variability for the applicators (A, B) if they are used on repeated transects 10m apart, travelling in alternate direction for each pass.
- 2) Determine the optimum distance between transects that should be used to minimize the co-efficient of variability for the applicators (A, B), travelling in alternate direction for each pass. Note: This may require two different distances depending on travel direction.